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No. 124

ASIATIC PILOT

VOL. III

1909

DEPARTMENT OF THE NAVY · BUREAU OF EQUIPMENT

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No. 124

ASIATIC PILOT

Volume III

COAST OF CHINA, YALU RIVER TO HONGKONG WITH FORMOSA

1909

PUBLISHED BY THE HYDROGRAPHIC OFFICE
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WASHINGTON
GOVERNMENT PRINTING OFFICE
1910

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PREFACE.

This volume of sailing directions for the coast of China is compiled from all available information, and is taken principally from the China Sea Directory published by the British Admiralty.

It comprises the coast and waters adjacent thereto, between the Yalu river and Hongkong and vicinity.

HYDROGRAPHIC OFFICE, *Washington, 1910.*

NOTE.

This publication comprises the sailing directions for the coast of China from the Yalu river to Canton, with Formosa. It contains the latest available information from all reliable sources and includes all Hydrographic Office Notices to Mariners relating to the coasts of which it treats up to and including No. 27 of 1909.

The bearings and courses are true and are given in degrees from 0° to 360°, commencing at the north and increasing to the right, in accordance with the system recently adopted by the United States Navy.

Bearings limiting sectors of lights are toward the light.

The direction of winds refer to the points from which they blow; of currents, the points toward which they set. These directions are true.

Variations for the year 1910, with the annual rate of change, may be obtained from the variation chart in front of the book.

Distances are expressed in nautical miles, the mile being approximately 2,000 yards.

Soundings are referred to mean low water.

Heights are referred to mean high water.

The latest information regarding lights should always be sought in the light lists.

Mariners are earnestly requested to notify the United States Hydrographic Office, directly or through one of its branch offices, of any new information obtained or of any errors or omissions discovered in this publication.

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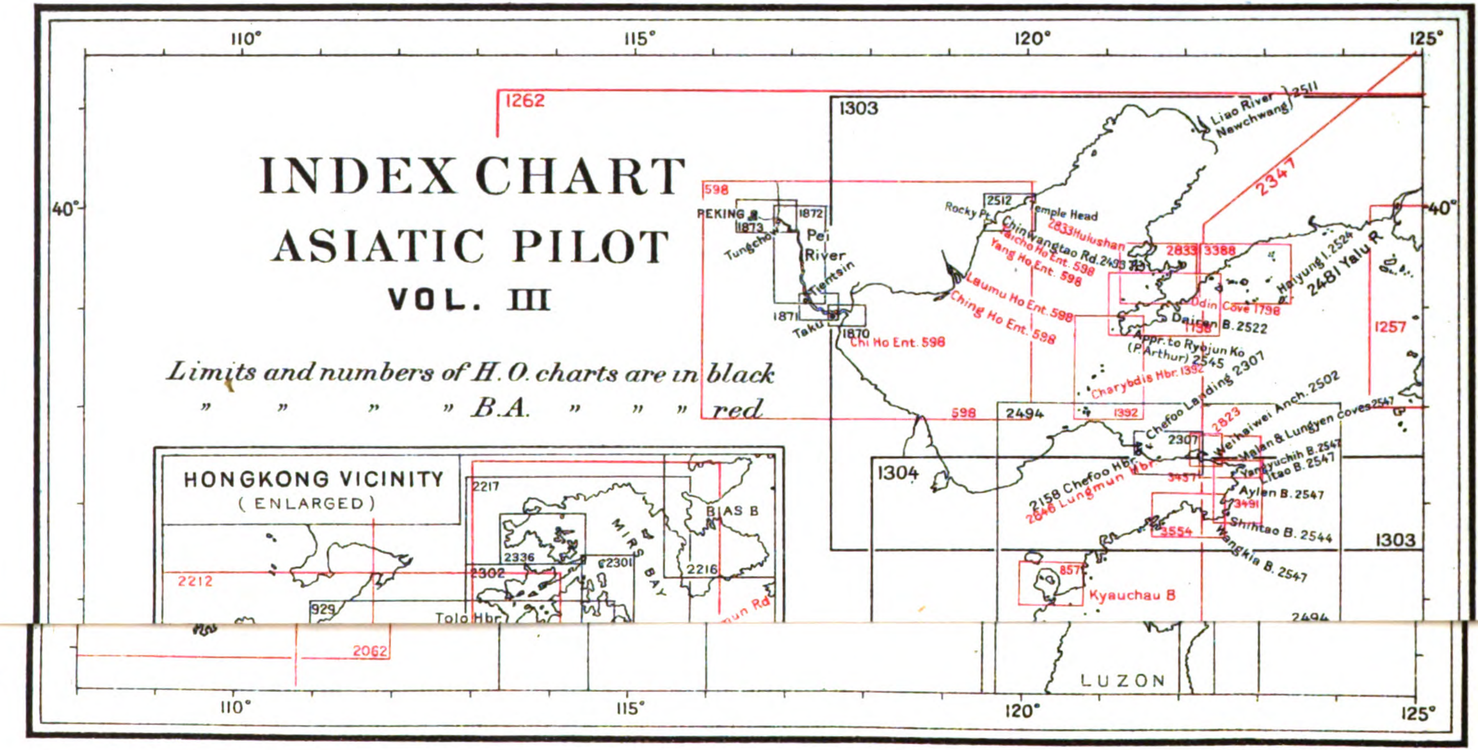

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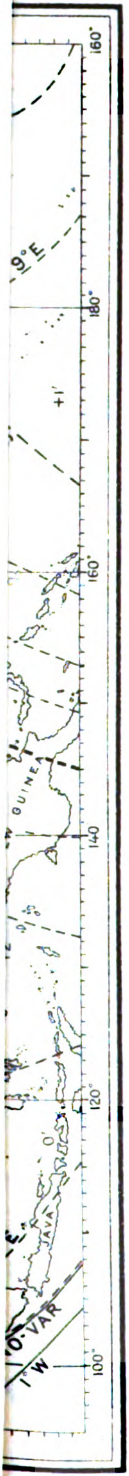

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A Short Glossary of Chinese Words Occurring in the Charts and Sailing Directions.

Chinese.	English.	Chinese.	English.
Cha	Barrier.	Hu	Lake, reservoir.
Chakwang mu.	Boom.	Hung	Red.
Chau	District city of the second order, islet.	Hwan	Bay.
Cheng, Chin	Town or city.	Hwang	Yellow.
Chow chow	Rippling of water.[a]	I	Barbarian.
Chuen	Channel.	Kau	Mouth.
Chung yuen	Mainland.	Kiang	River.
Fau fu	Buoy.	Kiau	Bridge.
Fau tau	Roadstead.	Kin	Gold.
Fu	District city of the first order.	King	Capital city.
Gau	Harbor.	King chi chau	Peninsula.
Hai	Sea.	Ko	Rocky peak, headland.
Hai kau	Bight, creek.	Kwan	Custom-house.
Hai kio	Cape.	Kwang lau	Light-house.
Hai mun	Estuary.	Ku	Valley.
Hai yau	Gulf.	Lau	Tower, old.
He	Black.	Leang	Ledges.
Hia	Gorge, lower.	Li	Inner, one-third of a mile.
Hia kau	Strait.	Lin	Forest.
Hiang tsun	Village.	Ling	Chain of hills, mountain pass.
Hien, Hsien	District city of the third order.	Lung	Tiger.
Ho	River.	Ma	Horse.
Ho tun	Light-house.	Ma tau	Jetty, port.
		Miau	Temple.

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[a] Chow chow water is a term applied to ripplings or eddies caused by the meeting of adverse currents, the stream passing over uneven rocky bottom or round the sharp bend of a river, which are frequently so violent as to render a vessel unmanageable when within their influence.

A Short Glossary of Chinese Words Occurring in the Charts and Sailing Directions—Continued.

Chinese.	English.
Mum	Pass.
Muren	River.
Nan	South, southern.
Ni	Mud.
Nui	Inner.
Pa	Island.
Pau tai	Fort.
Pe, pei	North.
Pe	White.
Po	Lake.
Pu	Sea shop.
Pwang she	Rocks.
Sampan	Boat.
Sha	Sand, sand bank.
Sha sien	Shoal.
Sha tan	Bar.
Shan, san	Hill, mountain.
Shan hu	Coral.
Shan tau	Bluff, cliff.
Shan ting	Mountain chain.
Shang	Upper.
She	Stone.
She tan	Reef.
Shin	Spirit (celestial).
Shui	Water, small river.
Si	West, western.
Siau	Small.
Siau ho	Rivulet.
So	Town, village.
Ta	Pagota, great.
Tan	Rapid, shoal or bar.
Tau tu	Clay.
Ting, Ti tau	Promontory.
To	Bay.
To mu	Wooded.
Tsi	Ravine.
Tsiau pi	Cliff.
Tsui	Veak.
Tsui sha	Gravel.
Tsui wei	Rocky, stony.
Tung	East, eastern.
Tutan	Ferry.
Wan	Bay.
Wi mo ti	Isthmus.
Wei	Outer, military post.
Yang	Sheep.
Yen tun	Beacon, buoy.

INFORMATION RELATING TO NAVIGATIONAL AIDS AND GENERAL NAVIGATION.

THE CORRECTION OF CHARTS, LIGHT LISTS, AND SAILING DIRECTIONS.

The following-named publications are issued by the United States Hydrographic Office as guides to navigation: Charts, Chart Catalogues, Sailing Directions, Light Lists, Tide Tables, Notices to Mariners, Pilot Charts, and Hydrographic Bulletins. Of these, the Notices to Mariners and the Hydrographic Bulletins are free to mariners and others interested in shipping. The Pilot Charts are free to contributors of professional information, but sold to the general public at 10 cents a copy. The other publications of the office are sold under the law at cost price.

The Charts, the Sailing Directions, and the Light Lists are all affected by continual changes and alterations, concerning which information is published weekly to all parts of the world in the Notices to Mariners.

The Charts should always be, so far as our knowledge permits, absolutely correct to date; and the Light Lists should be noted for the recent alterations and additions. The Sailing Directions, however, can not, from their nature, be so fully corrected, and in all cases where they differ from the charts, the charts must be taken as the guide.

Charts.—When issued from the Hydrographic Office, the charts have received all necessary corrections to date.

All small but important corrections that can be made by hand are given in the Notices to Mariners, and should at once be placed on the charts to which they refer.

Extensive corrections that can not be conveniently thus made are put upon the plates, and new copies are issued to the ships to replace the old, which are directed to be destroyed to prevent the possibility of their being used in the navigation of the ship.

The dates on which extensive corrections are made are noted on the chart on the right of the middle of the lower edge; those of the smaller corrections at the left lower corner.

In all cases of quotations of charts these dates of corrections should be given, as well as the number of the chart (found in the right lower corner), in order that the edition of the chart referred to may be known.

The Light Lists are corrected before issue, and all changes are published in the weekly Notices to Mariners.

The navigating officer should make notations in the Light Lists and paste in at the appropriate places slips from the Notices to Mariners.

The Light Lists should always be consulted as to the details of a light, as the description in the Sailing Directions may be obsolete, in consequence of changes since publication.

The Sailing Directions are corrected before issue, and subsequently should be kept corrected by means of the Notices to Mariners.

Supplements are published from time to time and contain all the information received up to date since the publication of the volume to which they refer, canceling all previous Notices to Mariners.

The existence of Supplements or Notices to Mariners is to be noted in the tabular form inside the cover of each volume.

To enable the books to be more conveniently corrected, Supplements and Notices to Mariners are printed on one side only, and two copies are issued to each ship—one to be cut and the slips pasted in at the appropriate places, the other to be retained intact for reference.

To make the notations and paste in the slips, as the Notices to Mariners are received, is one of the duties of the navigating officer demanding faithful attention.

It must, however, be understood that Sailing Directions will rarely be correct in all details, and that, as already stated, when differences exist, the chart, which should be corrected from the most recent information, should be taken as the guide, for which purpose, for ordinary navigation, it is sufficient.

The Tide Tables, which are published annually by the United States Coast and Geodetic Survey, give the predicted times and heights of the high and the low waters for every day in the year at 70 of the principal ports of the world, and, through the medium of these by means of tidal differences and ratios, at a very large number of subordinate ports. The Tables for the Atlantic and the Pacific coast ports of the United States are also published separately.

It should be remembered that these tables aim to give the times of high and low water, and not the times of turning of the current or of slack water, which may be quite different.

Notices to Mariners, containing fresh information pertaining to all parts of the world, are published weekly and mailed to all United States ships in commission, Hydrographic branch offices and agencies, United States consulates, and foreign hydrographic offices. Copies are furnished free by the main office or by any of the branch offices on application.

With each Notice is sent also a separate sheet, giving the items relating to lights contained in the latest Notice, intended especially for use in correcting the Light Lists.

Pilot Charts of the North Atlantic and North Pacific oceans are published near the beginning of each month. These charts give the average conditions of wind and weather, barometer, percentage of fog and gales, and routes for steam and sailing vessels for the month of issue; ice and derelicts of the preceding month; ocean currents and magnetic variation for the year; storm tracks of preceding years; and much other useful information. They are furnished free only in exchange for marine data or observations.

Hydrographic Bulletins, published weekly, are supplemental to the North Atlantic Pilot Chart and contain the latest news of wrecks and derelicts along the American coast and ocean routes, Arctic ice, reports of the use of oil to calm the sea, and other information for mariners. They are to be had free upon application.

THE USE OF CHARTS.

Accuracy of chart.—The value of a chart must manifestly depend upon the character and accuracy of the survey on which it is based, and the larger the scale of the chart the more important do these become.

To judge of a survey, its source and date, which are generally given in the title, are a good guide. Besides the changes that may have taken place since the date of the survey in waters where sand or mud prevails, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail; until a plan founded on such a survey is tested it should be regarded with caution. It may indeed be said that, except in well-frequented harbors and their approaches, no surveys yet made have been so minute in their examination of the bottom as to make it certain that all dangers have been found. The fullness or scantiness of the soundings is another method of estimating the completeness of the survey, remembering, however, that the chart is not expected to show all soundings that were obtained. When the soundings are sparse or unevenly distributed it may be taken for granted that the survey was not in great detail.

Large or irregular blank spaces among soundings mean that no soundings were obtained in these spots. When the surrounding soundings are deep it may fairly be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch or pinnacle rock.

A wide berth should therefore be given to every rocky shore or patch, and instead of considering a coast to be clear, the contrary should be assumed.

Fathom curves a caution.—Except in plans of harbors that have been surveyed in detail, the 5-fathom curve on most charts may be considered as a danger line, or caution against unnecessarily approaching the shore or bank within that line on account of the possible existence of undiscovered inequalities of the bottom, which only an elaborate detailed survey could reveal. In general surveys of coasts, or of little-frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for so detailed a survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The 10-fathom curves on rocky shores is another warning, especially for ships of heavy draft.

A useful danger line will be obtained by tracing out with a colored pencil or ink the line of depth next greater than the draft of the ship using the chart. For vessels drawing less than 18 feet the edge of the sanding serves as a well-marked danger line.

Charts on which no fathom curves are marked must especially be regarded with caution, as indicating that soundings were too scanty and the bottom too uneven to enable the lines to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed around, as it is doubtful how closely the spot may have been examined and whether the least depth has been found.

The chart on largest scale should always be used on account of its greater detail and the greater accuracy with which positions may be plotted on it.

Caution in using small-scale charts.—In approaching the land or dangerous banks regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large-scale chart, whereas on one of small scale the same amount of displacement means a large fraction of a mile.

Distortion of printed charts.—The paper on which charts are printed has to be damped. On drying distortion takes place from the inequalities of the paper, which greatly varies with different paper and the amount of the original damping, but it does not affect navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted on the chart, especially if the lines to objects be long. The larger the chart the greater the amount of this distortion.

Mercator's chart.—Observed bearings are not identical with those measured on the mercator chart (excepting only the bearings North and South, and East and West on the equator) because the line of sight, except as affected by refraction, is a straight line, and lies in the plane of the great circle, while the straight line on the chart (except the meridian line) represents, not the arc of a great circle, but the loxodromic curve, which on the globe is a spiral terminating at the pole, or, if the direction be East and West, a circle of latitude.

The difference is not appreciable with near objects, and in ordinary navigation may be neglected. But in high latitudes, when the objects are very distant, and especially when lying near east or west, the bearings must be corrected for the convergence of the meridians in order to be accurately placed on the mercator chart, which represents the meridians as parallel.

On the polyconic chart, since a straight line represents (within the limits of 15 or 20 degrees of longitude) the arc of a great circle or the shortest distance between two points, bearings on the chart are identical with observed bearings.

The Mercator projection is evidently unsuited to surveying, for which purpose the polyconic projection is used by the Hydrographic Office and the Coast and Geodetic Survey, and the gnomonic projection by the British service.

Notes on charts should always be read with care, as they may give important information that can not be graphically represented.

Buoys.—It is manifestly impossible to rely on buoys always maintaining their exact positions. Buoys should therefore be regarded as warnings, and not as infallible navigating marks, especially when in exposed places; and a ship's position should always, when possible, be checked by bearings or angles of fixed objects on shore.

Gas buoys.—The lights shown by gas buoys can not be implicitly relied on; the light may be altogether extinguished, or, if intermittent, the apparatus may get out of order.

Lights.—All the distances given in the light lists and on the charts for the visibility of lights are calculated for a height of 15 feet for the observer's eye. The effect of a greater or less height of eye can be ascertained by means of the table of distances of visibility due to the height, published in the light lists.

The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Refraction, too, may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light, the fact may be forgotten that aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be afterwards obtained from the standard compass.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip, it may be determined whether the ship is on the circle of visibility corresponding with the usual height of the eye or unexpectedly nearer the light.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze and no dependence can be placed on its being seen.

The power of a light can be estimated by its order, as stated in the light lists, and in some cases by noting how much its visibility in clear weather falls short of the range corresponding to its height. Thus, a light standing 200 feet above the sea and recorded as visible only 10 miles in clear weather is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles if of sufficient power.

Fog signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from the influence of the wind large areas of silence have been found in different directions and at different distances from the origin of sound, even in clear weather; therefore, too much confidence should not be felt as to hearing a fog signal. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly toward the land and is not observed by the lighthouse people until upon them; a ship may have been for many hours in it and approaching the land in confidence, depending on the signal, which is not sounded. When sound travels against the wind it may be thrown upward. A man aloft might then hear it, though inaudible on deck.

Taken together, these facts should induce the utmost caution in closing the land in fogs. The lead is generally the only safe guide and should be faithfully used.

Tides.—A knowledge of the times of high and low water and of the amount of vertical rise and fall of the tide is of great importance in the case of vessels entering or leaving port, especially when the channel depths are less than or near their draft. Such knowledge is also useful at times to vessels running close along a coast in enabling them to anticipate the effect of the tidal currents in setting them on or off shore. This is especially important in fog or thick weather.

The predicted times and heights of the high and low waters, or differences by which they may be readily obtained, are given in the tide tables for all the important ports of the world. The height at any intermediate time may be obtained by means of Table 2 for most of the principal tidal stations of the United States given in Table 1, and for the subordinate stations of Table 3 by multiplying its values by the ratio of mean ranges, provided the duration of rise and fall is sensibly the same at the subordinate as at the principal station. The intermediate height may also be obtained by plotting the predicted times and heights of high and low water and connecting the points by a curve. Such knowledge is often useful in crossing a bar or shallow flats.

Planes of reference.*—The plane of reference for soundings on Hydrographic Office charts made from United States Government surveys and on Coast and Geodetic Survey charts of the Atlantic coast of the United States is mean low water; on the Pacific coast of the United States as far as the strait of Fuca, it is the mean of the lower low waters; and from Puget sound to Alaska the Survey has adopted the harmonic or Indian tide plane, which is roughly that of the lowest low waters observed.

On most of the British Admiralty charts the plane of reference is the low water of ordinary springs; on French charts, the low water of equinoctial springs.

In the case of many charts compiled from old or various sources the plane of reference may be in doubt. In such cases, or whenever not stated on the chart, the assumption that the reference plane is mean low water gives the largest margin of safety.

Whichever plane of reference may be used for a chart, it must be remembered that there are times when the tide falls below it. Low water is lower than mean low water about half the time, and when a new or full moon occurs at perigee the low water is lower than the average low water of springs. At the equinoxes the spring range is also increased on the coasts of Europe, but in some other parts of the world, and especially in the Tropics, such periodic low tides may coincide more frequently with the solstices.

Wind or a high barometer may at times cause the water to fall below even a very low plane of reference.

On coasts where there is much diurnal inequality in the tides the amount of rise and fall can not be depended upon, and additional caution is necessary.

Mean sea level.—The important fact should be remembered that the depths at half tide are practically the same for all tides, whether neaps or springs. Half tide, therefore, corresponds with mean sea level. This makes a very exact plane of reference, easily found, to which it would be well to refer all high and low waters.

The tide tables give, in Table 3, for all the ports, the plane of reference to which tidal heights are referred and its distance below mean sea level.

If called on to take special soundings for the chart at a place where there is no tidal bench mark, mean sea level should be found and the plane for reductions established at the proper distance below it, as ascertained by the tide tables, or by observations, or in some cases, if the time be short, by estimation, the data used being made a part of the record.

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* The distinction between "rise" and "range" of the tide should be understood. The former expression refers to the height attained above the datum plane for soundings, differing with the different planes of reference; the latter, to the difference of level between successive high and low waters.

Tidal streams.—In navigating coasts where the tidal range is considerable especial caution is necessary. It should be remembered that there are indrafts to all bays and bights, although the general run of the stream may be parallel with the shore.

The turn of the tidal stream offshore is seldom coincident with the time of high and low water on the shore. In some channels the tidal stream may overrun the turn of the vertical movement of the tide by 3 hours, forming what is usually known as tide and half tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

The effect of the tidal wave in causing currents may be illustrated by two simple cases:

(1) Where there is a small tidal basin connected with the sea by a large opening.

(2) Where there is a large tidal basin connected with the sea by a small opening.

In the first case the velocity of the current in the opening will have its maximum value when the height of the tide within is changing most rapidly, i. e., at a time about midway between high and low water. The water in the basin keeps at approximately the same level as the water outside. The flood stream corresponds with the rising, and the ebb with the falling of the tide.

In the second case the velocity of the current in the opening will have its maximum value when it is high water or low water without, for then there is the greatest head of water for producing motion. The flood stream begins about three hours after low water, and the ebb stream about three hours after high water, slack water thus occurring about midway between the tides.

Along most shores not much affected by bays, tidal rivers, etc., the current usually turns soon after high water and low water.

The swiftest current in straight portions of tidal rivers is usually in the middle of the stream, but in curved portions the most rapid current is toward the outer edge of the curve, and here the water will be deepest. The pilot rule for best water is to follow the ebb tide reaches.

Countercurrents and eddies may occur near the shores of straits, especially in bights and near points. A knowledge of them is useful in order that they may be taken advantage of or avoided.

A swift current often occurs in a narrow passage connecting two large bodies of water, owing to their considerable difference of level at the same instant. The several passages between Vineyard sound and Buzzards bay are cases in point. In the Woods Hole passage the maximum strength of the tidal streams occurs near high and low water.

Tide rips are made by a rapid current setting over an irregular bottom, as at the edges of banks where the change of depth is considerable.

Current arrows on charts show only the most usual or the mean direction of a tidal stream or current; it must not be assumed that the direction of a stream will not vary from that indicated by the arrow. The rate, also, of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

FIXING POSITION.

Sextant method.—The most accurate method available to the navigator of fixing a position relative to the shore is by plotting with a protractor sextant angles between well-defined objects on the chart; this method, based on the " three-point problem " of geometry, should be in general use.

For its successful employment it is necessary: First, that the objects be well chosen; and, second, that the observer be skillful and rapid in his use of the sextant. The latter is only a matter of practice.

Near objects should be used either for bearings or angles for position in preference to distant ones, although the latter may be more prominent, as a small error in the bearing or angle or in laying it on the chart has a greater effect in misplacing the position the longer the line to be drawn.

On the other hand, distant objects should be used for direction because less affected by a small error or change of position.

The three-arm protractor (station pointer of the British service) consists of a graduated brass circle with one fixed and two movable radial arms, the three beveled edges of the arms, if produced, intersecting at the exact center of the instrument. The edge of the fixed arm marks the zero of the graduation which enables the movable arms to be set at any angles with the fixed arm.

To plot a position, the two angles observed between the three selected objects are set on the instrument, which is then moved over the chart until the three beveled edges pass respectively and simultaneously through the three objects. The center of the instrument will then mark the ship's position, which may be pricked on the chart or marked with a pencil point through the center hole.

The tracing-paper protractor, consisting of a graduated circle printed on tracing paper, is an excellent substitute for the brass instrument and in some cases preferable to it, as when, for instance, the objects angled on are so near the observer that they are more or less hidden by the circle of the instrument. The paper protractor also permits the laying down for simultaneous trial of a number of angles in cases of fixing important positions. Plain tracing paper may also be used if there are any suitable means of laying off the angles.

The value of a determination depends greatly on the relative positions of the objects observed. If the position sought lies on the circle passing through the three objects (in which case the sum of the observed angles equals the supplement of the angle at the middle object made by lines from the other two) it will be indeterminate, as it will plot all around the circle. An approach to this condition must be avoided. Near objects are better than distant ones, and, in general, up to 90° the larger the angles the better, remembering always that large as well as small angles may plot on or near the circle and hence be worthless. If the objects are well situated, even very small angles will give for navigating purposes a fair position, when that obtained by bearings of the same objects would be of little value.

Accuracy requires that the two angles be simultaneous. If under way and there is but one observer, the angle that changes less rapidly may be observed both before and after the other angle and the proper value obtained by interpolation.

A single angle and a range give in general an excellent fix, easily obtained and plotted.

Advantages of sextant method.—In war time, when the compass may be knocked away or rifle fire make it undesirable to expose the person more than necessary, a sextant offers great advantages, as angles can be obtained at any point where the objects are visible. This contingency makes it especially desirable that all navigating officers of men-of-war should become expert in this method of fixing a ship's position.

In many narrow waters, also, where the objects may yet be at some distance, as in coral harbors or narrow passages among mud banks, navigation by sextant and protractor is invaluable, as a true position can in general be obtained only by its means. Positions by bearings are too rough to depend upon, and a small error in either taking or plotting a bearing might under such circumstances put the ship ashore.

In all cases where great accuracy of position is desired, such as the fixing of a rock or shoal or of fresh soundings or new buildings as additions to the chart, the sextant should invariably be used. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. If a round of angles can be taken, the observer's accuracy is also checked. In the case of ordinary soundings a third angle need be taken only occasionally; first, to check the general accuracy of the chart, as above stated; second, to make certain that the more important soundings, as at the end of a line, are correctly placed.

If communication can be had with the shore, positions may be fixed with great accuracy by occupying with theodolite or sextant two known points of the chart. The third angle of the triangle, that between the two points at the position sought, should be measured as a check.

The compass.—It is not intended that the use of the compass to fix the ship should be given up; in ordinary piloting the compass, with its companion, the alidade, may be more usefully employed for this purpose, although less accurate than the sextant.

If the accuracy of the chart be doubtful, the compass should be used in preference to the sextant.

In fixing by the compass it should always be remembered that the position by two bearings only, like that by two angles only, is liable to error. An error may be made in taking a bearing, or in applying to it the deviation, or in laying it on the chart. A third or check bearing should, therefore, be taken of some other object, especially when near the shore or dangers. A common intersection for the three lines assures accuracy.

Compass bearing and sextant angle.—When only two objects are visible, a compass bearing and a sextant angle may be used, and a better fix obtained than by two bearings.

Doubling the angle on the bow.—The method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "bow and beam bearing," the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives the maximum of accuracy, and is an excellent fix for a departure, but does not insure safety, as the object observed and any dangers off it are abeam before the position is obtained.

By taking the bearings at two points and four points on the bow, a fair position is obtained before the object is passed, the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current. Taking afterwards the beam bearing gives, with slight additional trouble, the distance of the object when abeam; such beam bearings and distances, with the times, should be continuously recorded as fresh departures, the importance of which will be appreciated in cases of being suddenly shut in by fog.

A table of multipliers of the distance run in the interval between any two bearings of an object, the product being its distance at the time of the second bearing, is given in the light list and in Bowditch.

Danger angle.—The utility of the danger angle in passing outlying rocks or dangers should not be forgotten. In employing the horizontal danger angle, however, caution is necessary, as, should the chart be inaccurate, i. e., should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

The vertical danger angle may be conveniently used when passing elevated points of known heights, such as lighthouses, cliffs, etc. The computation of the distance corresponding to the height of the object and its angular elevation requires for small distances merely the solution of a plane right triangle; the natural cotangent of the angle multiplied by the height in feet gives the distance in feet. The convenient use of this method, however, requires tables such as those published by Captain Lecky in his little book entitled "The Danger Angle and Offshore Distance Tables."

This book very usefully extends the vertical angle method to finding a ship's position at sea by observing the angular altitude of a peak of known height and its bearing. The tables give heights up to 18,000 feet and distances up to 110 miles. When the angles are not too large they should be observed "on and off the limb" and the index error of the sextant thus eliminated, in preference to correcting for it the single altitude. It must be remembered that in high latitudes the bearing of a distant object needs correction for the convergence of the meridians before being laid down on a mercator chart. The correction may be found by the following formula, using the approximate position: The sine of the correction equals the product of the sine of half the difference of longitude by the sine of the middle latitude. It is applied on the equatorial side of the observed bearing, and its effect is always to increase the latitude of the observer.

Soundings taken at random are of little value in fixing or checking position and may at times be misleading. In thick weather, when near or closing the land, soundings should be taken continuously and at regular intervals, and, with the character of the bottom, systematically recorded. By laying the soundings on tracing paper, according to the scale of the chart, along a line representing the track of the ship, and then moving the paper over the chart parallel with the course until the observed soundings agree with those of the chart, the ship's position will in general be quite well determined. This plan was suggested by Lord Kelvin, whose admirable sounding machine renders the operation of sounding possible in quite deep water without slowing down the ship and consequent loss of time.

Pelorus.—All ships should be supplied with the means of taking accurate bearings both by day and by night. The standard compass is not always conveniently placed for the purpose; in such case some species of pelorus or dumb compass is of great importance. The utility of such an instrument in ascertaining the change of bearing of an approaching ship's light should not be forgotten.

Sumner's method.—Among astronomical methods of fixing a ship's position the great utility of Sumner's method should be well understood, and this method should be in constant use. The Sumner line—that is, the line drawn through the two positions obtained by working the chronometer observation for longitude with two assumed latitudes, or by drawing through the position obtained with one latitude a line at right angles to the bearing of the body as obtained from the azimuth tables—gives at times invaluable information, as the ship must be somewhere on that line provided the chronometer is correct. If directed toward the coast, it marks the bearing of a definite point; if parallel with the coast the distance of the latter is shown. Thus the direction of the line may often be usefully taken as a course. A sounding at the same time with the observation may often give an approximate position on the line. A very accurate position can be obtained by observing two or more stars at morning or evening twilight, at which time the horizon is well defined. The Sumner lines thus obtained will, if the bearings of the stars differ three points or more, give an excellent result. A star or planet at twilight and the sun afterwards or before may be combined; also two observations of the sun with sufficient interval to admit of a considerable change of bearing. In these cases one of the lines must be moved for the run of the ship. The moon is often visible during the day and in combination with the sun gives an excellent fix.

The morning and evening twilight observations, besides their great accuracy, possess the additional advantage of greatly extending the ship's reliable reckoning beyond the limits of the ordinary day navigation and correspondingly restricting the dead-reckoning uncertainties of the night. An early morning fix in particular is often of great value.

Observations of the stars at night require the use of the star telescope in order to define the horizon. Though the same degree of accuracy as at twilight can not be expected, night observations are a very valuable dependence and should be assiduously practiced.

Piloting.—The navigator, in making his plan for entering a strange port, should give very careful previous study to the chart and should carefully select what appear to be the most suitable marks for use, also providing himself with substitutes, to use in case those selected as most suitable should prove unreliable in not being recognized with absolute certainty. It must be remembered that buoys seen at a distance in approaching a channel are often difficult to place or identify, because all may appear equally distant, though in reality far apart. Ranges should be noted, if possible, and the lines drawn, both for leading through the best water in channels and also for guarding against particular dangers; for the latter purpose safety bearings should in all cases be laid down where no suitable ranges appear to offer. The courses to be steered in entering should also be laid down and distances marked thereon. If intending to use the sextant and danger angle in passing dangers, and especially in passing between dangers, the danger circles should be plotted and regular courses planned, rather than to run haphazard by the indications of the angle alone, with the possible trouble to be apprehended from wild steering at critical points.

The pelorus or dumb compass should invariably be mounted in entering or leaving port and kept faithfully set to the magnetic direction of the ship's head, changing promptly with every change of course, so that the observed bearings may be magnetic, and therefore ready for the chart without the necessity of waiting to apply corrections. The chart should be on the bridge in readiness for reference or use in plotting positions.

The ship's position should not be allowed to be in doubt at any time, even in entering ports considered safe and easy of access, and should be constantly checked, continuing to use for this purpose those marks concerning which there can be no doubt until others gradually and unmistakably declare themselves.

The ship should ordinarily steer exact courses and follow an exact line, as planned from the chart, changing course at precise points, and, where the distances are considerable, her position on the line should be checked at frequent intervals, with recordings of time and patent log. This is desirable even where it may seem unnecessary for safety, because if running by the eye alone and the ship's exact position be suddenly required, as in a sudden fog or squall, fixing at that particular moment may be attended with difficulty.

The habit of running exact courses with precise changes of course will be found most useful when is is desired to enter port or pass through inclosed waters during fog by means of the buoys; here safety demands that the buoys be made successively, to do which requires, if the fog be dense, very accurate courses and careful attention to the times , the patent log, and the set of the current; failure to make a buoy as expected leaves as a rule no safe alternative but to anchor at once, with perhaps a consequent serious loss of time.

It is a useful point to remember that in passing between dangers where there are no suitable leading marks, as, for instance, between two islands or an island and the main shore, with dangers extending from both, a mid-channel course may be steered by the eye alone with great accuracy, as the eye is able to estimate very closely the direction midway between visible objects.

In piloting among coral reefs or banks, a time should be chosen when the sun will be astern, conning the vessel from aloft or from an elevated position forward. The line of demarcation between the deep water and the edges of the shoals, which generally show as green patches, is indicated with surprising clearness. This method is of frequent application in the numerous passages of the Florida keys.

Changes of course should in general be made by exact amounts, naming the new course or the amount of the change desired, rather than by ordering the helm to be put over and then steadying when on the desired heading, with the possibility of the attention being diverted and so of forgetting in the meantime, as may happen, that the ship is still swinging. The helmsman, knowing just what is desired and the amount of the change to be made, is thus enabled to act more intelligently and to avoid wild steering, which in narrow channels is a very positive source of danger.

Coast piloting involves the same principles and requires that the ship's position be continuously determined or checked as the landmarks are passed. On well-surveyed coasts there is a great advantage in keeping near the land, thus holding on to the marks and the soundings, and thereby knowing at all times the position, rather than keeping offshore and losing the marks, with the necessity of again making the land from vague positions, and perhaps the added inconvenience of fog or bad weather, involving a serious loss of time and fuel.

The route should be planned for normal conditions of weather, with suitable variations where necessary in case of fog or bad weather or making points at night, the courses and distances, in case of regular runs over the same route, being entered in a notebook for ready reference, as well as laid down on the chart. The danger circles for either the horizontal or the vertical danger angles should be plotted, wherever the method can be usefully employed, and the angles marked thereon; many a mile may thus be saved in rounding dangerous points, with no sacrifice in safety. Ranges should also be marked in, where useful for position or for safety, and also to use in checking the deviation of the compass by comparing, in crossing, the compass bearing of the range with its magnetic bearing, as given by the chart.

Changes of course will in general be made with mark or object abeam, the position (a new "departure") being then, as a rule, best and most easily obtained. The pelorus, kept set to the ship's magnetic heading, should be at all times in readiness for use, and the chart where it may be readily consulted by the officer of the watch. The sextant should also be kept conveniently at hand.

A continuous record of the progress of the ship should be kept by the officer of the watch, the time and patent log reading of all changes of course and of all bearings, especially the two and four point bearings, with distance of object when abeam, being noted in a book kept in the pilot house for this especial purpose. The ship's reckoning is thus continuously cared for as a matter of routine and without the presence or particular order of the captain or navigating officer. The value of thus keeping the reckoning always fresh and exact will be especially appreciated in cases of sudden fog or when making points at night.

Where the coastwise trip must be made against a strong head wind, it is desirable, with trustworthy charts, to skirt the shore as closely as possible in order to avoid the heavier seas and adverse current that prevail farther out. In some cases, with small ships, a passage can be made only in this way. The important saving of coal and of time, which is even more precious, thus effected by skillful coast piloting makes this subject one of prime importance to the navigator.

Change in the variation of the compass.*—The gradual change in the variation must not be forgotten in laying down on the chart courses and positions by bearings. The magnetic compasses placed on the charts for the purpose of facilitating the plotting become in time slightly in error, and in some cases, such as with small scales or when the lines are long, the displacement of position from neglect of this change may be of importance. The date of the variation and the annual change, as given on the compass rose, facilitate corrections when the change has been considerable. The compasses are reengraved when the error amounts to a degree. More frequent alterations on one spot in a copper plate would not be practicable.

The geographical change in the variation is in some parts of the world so rapid as to need careful consideration, requiring a frequent change of the course. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles.

Local magnetic disturbance of the compass on board ship.—The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship. Observation shows that disturbance of the compass in a ship afloat is experienced in only a few places on the globe.

Magnetic laws do not permit of the supposition that the visible land causes such disturbance, because the effect of a magnetic force diminishes so rapidly with distance that it would require a local center of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow and the force strong, the compass may be temporarily deflected when passing over such a spot; but the area of disturbance will be small unless there are many centers near together.

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*See H. O. chart No. 2406, variation of the compass.

The law which has hitherto been found to hold good as regards local magnetic disturbance is that north of the magnetic equator the north end of the compass needle is attracted and south of the magnetic equator repelled by any center of disturbance.

It is very desirable that whenever a ship passes over an area of local magnetic disturbance the position should be fixed, and the facts, as far as they can be ascertained, reported.

Use of oil for modifying the effect of breaking waves.— Many experiences of late years have shown that the utility of oil for this purpose is undoubted and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil skillfully applied may prevent much damage both to ships (especially of the smaller classes) and to boats by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:

1. On free waves, i. e., waves in deep water, the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances, but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing else is obtainable; but all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, either when running, or lying-to, or in wearing.

6. No experiences are related of its use when hoisting a boat at sea or in a seaway, but it is highly probable that much time would be saved and injury to the boat avoided by its use on such occasions.

7. In cold water the oil, being thickened by the lower temperature and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. For a ship at sea the best method of application appears to be to hang over the side, in such a manner as to be in the water, small canvas bags, capable of holding from 1 to 2 gallons of oil, the bags being pricked with a sail needle to facilitate leakage of the oil.

The positions of these bags should vary with the circumstances. Running before the wind, they should be hung on either bow—e. g., from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying-to, the weather bow, and another position farther aft, seem the best places from which to hang the bags, using sufficient line to permit them to draw to windward while the ship drifts.

9. Crossing a bar with a flood tide, to pour oil overboard and allow it to float in ahead of the boat, which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect can not be so much trusted.

On a bar, with the ebb tide running, it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil can be diffused well ahead of the boat and the bag readily hauled on board for refilling, if necessary.

ILLUSTRATIONS AND BRIEF RULES.*

[In the illustrative figures, the flowing lines represent the spreading oil and the arrows denote the direction of the wind and sea.]

Fig. 1.

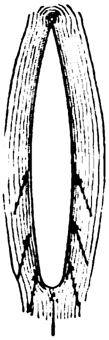
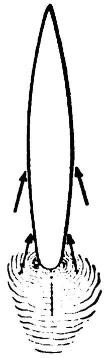


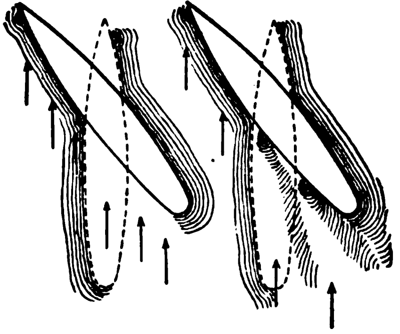
Fig. 2.



Scudding before a gale, Figure 1, distribute oil from the bow by means of oil bags or through waste pipes; it will thus spread aft and give protection both from quartering and following seas.

If distributed only astern, Figure 2, there will be no protection from the quartering sea.

Fig. 3. Fig. 4.



Running before a gale, yawing badly and threatening to broach-to, Figures 3 and 4, oil should be distributed from the bow and abaft the beam, on both sides.

In Figure 3, for instance, where it is only distributed at the bow, the weather quarter is left unprotected when the ship yaws.

In Figure 4, however, with oil bags abaft the beam as well as forward, the quarter is protected.

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*From prize essay of Capt. R. Karlowa, of Hamburg-American Steamship Co.

Fig. 5.

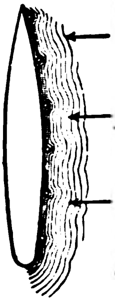


Fig. 6.

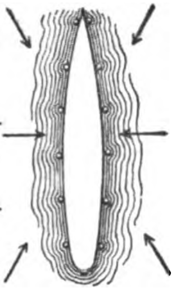


Fig. 7.

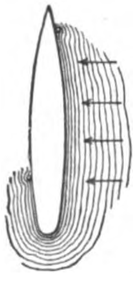
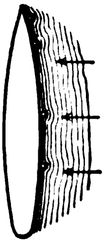


Fig. 8.



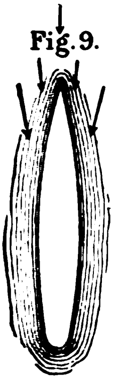
Lying-to, Figure 5, a vessel can be brought closer to the wind by using one or two oil bags forward, to windward. With a high beam sea, use oil bags along the weather side at intervals of 40 or 50 feet.

In a heavy cross sea, Figure 6, as in the center of a hurricane, or after the center has passed, oil bags should be hung out at regular intervals along both sides.

Drifting in the trough of a heavy sea, Figures 7 and 8, use oil from waste pipes forward and bags on weather side, as in Figure 8.

These answer the purpose very much better than one bag at weather bow and one at lee quarter, although this has been tried with some success, see Figure 7.

Fig. 9.



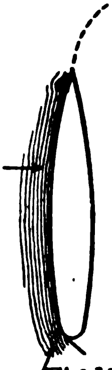
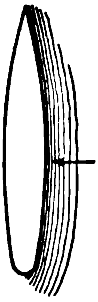


Fig. 10.

Fig. 11.

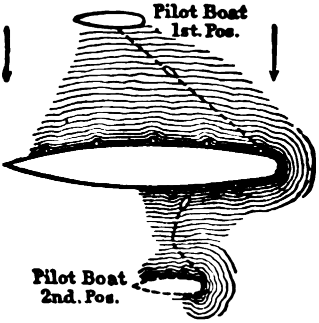


Steaming into a heavy head sea, Figure 9, use oil through forward closet pipes. Oil bags would be tossed back on deck.

Lying-to, to tack or wear, Figure 10, use oil from weather bow.

Cracking on, with high wind abeam and heavy sea, Figure 11, use oil from waste pipes, weather bow.

Fig. 12.



A vessel hove-to for a pilot, Figure 12, should distribute oil from the weather side and lee quarter. The pilot boat runs up to windward and lowers a boat, which pulls down to leeward and around the vessel's stern. The pilot boat runs down to leeward, gets out oil bags to windward and on her lee quarter, and the boat pulls back around her stern, protected by the oil. The vessels drift to leeward and leave an oil slick to windward, between the two.

Fig. 13.

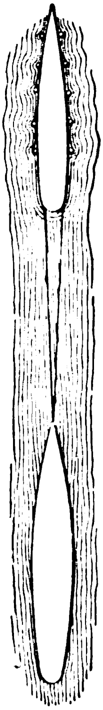
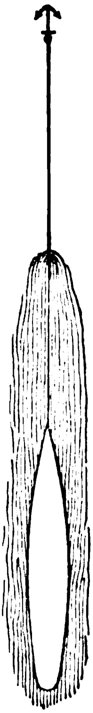


Fig. 14.



Towing a vessel in a heavy sea, oil is of the greatest service and may prevent parting the hawser. Distribute from the towing vessel, forward on both sides, Figure 13. If used only aft, the tow alone gets the benefit.

At anchor in an open roadstead, use oil in bags from jib boom, or haul them out ahead of the vessel by means of an endless rope rove through a tail block secured to the anchor chain, Figure 14.

CHAPTER I.

CHINA—GENERAL REMARKS.

Area.—The Chinese Empire includes, besides China proper, Manchuria and Mongolia in the north, and eastern Turkestan and Tibet in the west; it extends between the parallels of latitude of 18° 30′ N. and 53° 30′ N. and the meridians of longitude of 72° 00′ E. and 130° 00′ E., and is bounded on the north by Asiatic Russia along a frontier extending nearly 3,000 miles.

China proper extends between the parallels of latitude of 18° 10′ N. and 42° 30′ N. and between the meridians of longitude of 97° 30′ E. and 122° 00′ E.; its area is given as 1,532,420 square miles; its length from north to south is 1,860 miles, and its breadth from east to west 1,520 miles.

With the dependencies of Manchuria, Mongolia, Tibet, and Chinese Turkestan the total area is estimated at 4,277,170 square miles.

Coast.—The coast of the Chinese Empire, commencing at Ngan nan kiang in about Lat. 21° 35′ N., Long. 108° 19′ E., is bounded to the southward and eastward by the China sea, Formosa strait, Tung hai or Eastern sea, and Hwang hai or Yellow sea, and, including the Manchurian province of Shingking or Liaotung, terminates at the Yalu river in Lat. 40° 00′ N., Long. 124° 35′ E., which separates it from Korea.

Population.—In 1904 the American minister at Peking, after a careful inquiry, came to the conclusion that all the official estimates made within the last 150 years were erroneous and that the number of inhabitants of China proper is probably less than 270,000,000. The Chinese imperial customs in 1906 put the total population at 438,214,000.

Foreign population.—At the end of 1906 the imperial customs authorities estimated the total number of foreigners resident in China, including missionaries in the interior, as 38,597. Among them were 9,256 British, 15,548 Japanese, 3,447 Americans, 1,939 Germans, 3,184 Portuguese, 2,189 French, 389 Spaniards, 786 Italians, 273 Russians, and 297 Belgians, other nationalities being represented by very few members.

History.—The early history of China is involved in obscurity, but it is certain that at an early period it attained a high degree of civilization. The Chinese are believed to have entered the country from the north, and as they multiplied spread steadily southward, driving before them or absorbing the earlier inhabitants. Genghis Khan in the eleventh century entered and conquered China; his successors did much to improve the country. Their dynasty gradually lost its energy and was supplanted by one of the native Chinese princes, called the dynasty of Ming. In the seventeenth century this dynasty was overthrown in an irruption of the Manchu Tartars, who have since held the sovereignty of the Empire. The first attempt of the British to open a trade with China was in 1637; subsequently, the East India Company began to trade with the Empire. Down to 1842 Canton was the only place at which Europeans generally were tacitly allowed to carry on trade with the Empire; but in that year, after the war with the British, which concluded at the peace of Nanking, certain ports were opened to foreign trade.

In 1851 a great rebellion broke out in the Empire, and in 1856 a misunderstanding arose between Great Britain and China which led to the treaty of Tientsin in 1858. Another great rebellion, known as the Boxer outbreak, occurred in 1900.

China is the only State of vast dimensions that belongs to a non-European civilization, and of non-European civilizations the eastern Asiatic is the most civilized; of the present great empires it is the only one that can be called old.

The Emperor.—On November 14, 1908, the Empress Dowager of China died, her nephew, the Emperor Kuang Hsu, having died the day before, and leaving no son. By imperial edict, P'u I, the infant son of Tsai Feng, the Prince Regent, was appointed as successor to Tung Chih and also as heir to the Emperor Kuang Hsu.

Government.—The Emperor is supreme priest and King, and the capital of the Empire is Peking (northern capital), in Chihli province. The Neiko, or cabinet, administers the Empire under the direction of the privy council. Seven boards are intrusted, under the Neiko, with all civil appointments, the direction of rites and ceremonies, with military affairs, with public works, with criminal jurisdiction, and with the conduct of naval affairs. The Wai wu pu is intrusted with foreign affairs, the maritime customs, etc.

The provinces are mainly self-governed; each is presided over by a viceroy, who is supreme within his jurisdiction, and who has, in cases of emergency, the power of life and death in his hands. Next to him is the governor, whose authority in all matters relating to the province is second only to that of the viceroy.

FOREIGN SETTLEMENTS.—Macao, a Portuguese settlement, stands on a peninsula projecting from the southeastern end of the island of the same name, at the entrance of Canton river. This settlement, known to the Chinese as Ngao mun, was established by the

Portuguese in 1557, and remained the center of foreign trade with China, and the only outlet of commercial importance until the establishment of the colony of Hongkong in 1841. Macao was conceded to the Portuguese by treaty with the Chinese Government in 1863, but jurisdiction over the Chinese subjects was retained.

Hongkong.—The island of Hongkong, at the entrance of the Canton river, was ceded to Great Britain by treaty in 1841. The opposite peninsula of Kaulung, an area of 2¾ square miles, was ceded to Great Britain in 1861. In 1898 an agreement was concluded with the Chinese Government for the extension of the Hongkong territory by an area adjacent to British Kaulung, including Mirs and Deep bays and the island of Lantau, this area to be leased for 99 years.

Kyau chau, a town, harbor, and district on the southeast coast of the Shantung peninsula, was transferred to Germany on a 99 years' lease in 1898.

The area of the protectorate is about 200 square miles, exclusive of the bay. Surrounding the district is a neutral zone whose outer limit is 30 miles from high-water mark on the shore of the bay.

Wei hai wei.—The territory on the north coast of Shantung peninsula, leased to Great Britain in 1898, comprises Leu kung tau and all the islands in the bay of Wei hai wei, as well as a belt of land 10 miles wide extending along the entire shore line of the bay. The total area is about 285 square miles. In addition there is a zone of influence, lying east of the meridian of Long. 121° 40′ E., extending over an area of 1,500 square miles.

Formosa.—This island was ceded by China to Japan in 1895.

Port Arthur.—By agreement with China in 1898 Russia obtained a lease of Port Arthur and Talienhwan with adjacent seas and territory to the north. The duration of the lease is 25 years, but it may be extended. This territory was created a province named Kwangtung in 1899. By the treaty of peace signed at Portsmouth, N. H., September 5, 1905, the Russian Government ceded to Japan the lease of Port Arthur and adjacent territory and waters.

Physical features.—Apart from the large island Hainan, the whole Chinese Empire is compact, forming a great continuous area. Only one large peninsula juts out from the general outline of the coast. The irregularities of the coast, except in the great estuaries of the Canton river, Hangchau bay, and the Yangtze river, are comparatively small indentations. Southward of Hangchau bay the inlets and small coast islands are innumerable, forming many good harbors for junks, if not for ships; while northward of Hangchau bay, on the shores of the Yellow sea and the gulf of Pe chili, they are rare, except in Shantung peninsula, and even there not many of them are convenient for shipping.

China proper is separated in a very striking manner from the rest of Asia. On the north is the great desert of Mongolia, accessible only by a few mountain passes; on the west, the vast and lofty table lands of Thibet; on the southwest, a succession of high mountains and deep valleys shutting it off from India; and on the south, a less complicated mountain range separating it from Indo-China. Only northeastward, where China borders on Manchuria, is there easy communication by land.

One of the most remarkable features of China is a great plain in the east, stretching southward from the mountains northward of Peking to the lower valley of the Yangtze, through about 8° of latitude, with a breadth of about 3° to 6° of longitude, and comprising also the peninsula between the Yangtze estuary and Hangchau bay. The only interruption to it, which is partial, consists in the mountainous area which juts out in the peninsula of Shantung.

In all other parts of China mountains and other high lands prevail.

The north of China is characterized by the prevalence of a yellow earthy deposit of great fertility, named loess, which fills the valleys to a depth of thousands of feet and covers alike high and low grounds. It is apt to wear away in such a manner as to form terraced perpendicular precipices, and, being soft, is easily washed away from the banks of rivers, so that the rivers change their course frequently and their beds are encumbered by shoals. Partly from this circumstance, few of the rivers in the north are navigable.

The mountain range northward of Peking extends eastward and approaches the shore of the gulf of Liaotung in about Lat. 40° N., and a pile of mountains celebrated for their grandeur is situated near the city Kin cho. From the port of Newchwang a magnificent plain stretches northeastward to the river Amur; on the west this plain is bounded by the gradually rising mountains of Mongolia; the east part of the plain is skirted by usually low mountain ranges, which succeed each other eastward to the sea of Japan.

Rivers.—All the chief rivers of China have a general course from west to east; these, with their tributaries and artificial canals, furnish an unrivaled inland water communication.

Yangtze kiang.—This river, which is the first in size in the old world and next only to the Amazon and the Mississippi in the new, is the great navigable artery of China, and constitutes one of the chief elements in the development of her commerce, and a highway of the highest importance to trade. Its sources are on the eastern side of the mountains of Thibet, on the western side of which the Brahmaputra and the great rivers of Burma and Siam originate. The river, from its sources, called the Muhlusu, flows southeastward for about 1,000 miles, then being joined by the Yalung it turns sharply northeastward and eastward through the central regions of China, traversing its entire breadth in a course, inclusive of its windings, of fully 3,000 miles, and it flows into the Eastern sea at a direct distance of 1,900 miles from its source.

The Yangtze receives various names in its course, but it is difficult to define their limits. Above Tung ting lake it takes the name Kin ho (Golden river), or Kinsha kiang (Golden sand river); thence to Hankow or Poyang, the name Ta kiang (Great river); while its lower part is called Yangtze, the name universally adopted by foreigners. It is generally known to the people as the Kiang, or the River, a name it gives to three provinces.

The river below Hankow is now named the Lower Yangtze; between Hankow and Ichang, the Middle Yangtze, and above Ichang, which is distant 970 miles from the sea, the Upper Yangtze. The Lower and Middle sections are free from rapids and navigable at all seasons by steam vessels, while above Ichang the rapids are so numerous and dangerous that ordinary navigation by steam vessels is as yet considered impracticable and the traffic on this part of the river is carried on by junks.

The Yangtze is nowhere excelled in the number of its subsidiary streams, some of which are large rivers, by which the whole of the basin is rendered accessible.

Tributaries.—The Wusung river, the lowest tributary of the Yangtze, is about 60 miles in length, and joins it at about 35 miles from its mouth; on it is situated the treaty port of Shanghai. It flows from lake Tien shan or Miau, through which there is water communication with the Grand canal, and thence northward to the important city Suchau and southward to Hangchau fu. It has taken its commonly received name from Wusung village, situated about 1 mile within its entrance on the left bank and on the northern side of the creek leading to Suchau.

The Kan kiang is one of the great tributaries of the Yangtze, which it joins, after flowing through Poyang lake, on the northern border of the province of Kiangsi at 430 miles from the sea and 240 miles above Nanking. It runs centrally through, and, with its smaller affluents, drains the whole province. Nanchang, the provincial capital, is about 47 miles above the lake, and its walls are accessible on all sides by water; it is a town of about 500.000 inhabitants; its junk trade is small, with the exception of tea in the season, but timber is sent down in large quantities in strings of small rafts to get over the shallows, and is built into large rafts at Wuching. Two other large cities, Lin kiang and Ki ngan, are, respectively, 50 and 100 miles above Nanchang.

The Han kiang or Si yang ho, the largest tributary of the Yangtze on the north, joins it at Hankow, 600 miles from the sea. It rises in the southwest of Shensi, and drains the south of that province and the whole of Hupeh in its course of 500 miles.

The Siang and Yuen are two considerable affluents of the Yangtze. These rivers fall into Tung ting lake, which joins the Yangtze by its outlet at Tung ting junction, 116 miles above Hankow. The Siang drains the eastern part of Hunan province and flows into the southeastern part of the lake; on it are the cities of Chang sha, the capital of the province, and Siang tan hien; it is navigable, and vessels of light draft could ascend the river at its high-water season, pass by a canal into the Kweiling ho, and thence join the Si kiang at Wuchau. The Yuen falls into the western part of the lake after draining the western part of Hunan; on it is the important city of Chang teh; its mouth is blocked by mud banks, but it is entered by canals and creeks from the Siang and the Yangtze, and it is navigable by small craft and boats for about 450 miles.

The Upper Yangtze.—Ichang is 366 miles above Hankow, and between it and Chung king fu, 400 miles farther up, the river flows in a valley through a hilly and sometimes mountainous country. Its course is generally tortuous, and it passes through several narrow gorges and wider reaches, its width varying from about 175 to 700 yards, and its depth from 9 feet to 60 fathoms at low-river level, with a very uneven bed. In summer the water is over 50 feet higher at Ichang and 100 feet higher at Chungking than in winter. The current is usually swift, and there are numerous rapids, many of which are strong and dangerous, but all are affected by a rise or fall of the water.

From Chungking to Sui fu, a distance of 234 miles, the river is wider, running through much more open country and between comparatively low hills, with not nearly so swift a current, neither do the rapids nor serious obstacles appear to be so numerous.

From Sui fu to Ping shan hien, 46 miles, the river is from 300 to 600 yards in width, and is navigable to Anpien, a distance of 20 miles, but thence to Ping shan hien the swife current rapids and sunken rocks render navigation difficult at low river. The rapids above Ping shan hien are reported to be always bad.

Tributaries.—The Kien kiang flows northward through Kueichau province and into the Upper Yangtze at Fuchau, about 337 miles above Ichang; its mouth is blocked by reefs, but it is said to be navigable for some 100 miles.

The Kialing kiang is a northern tributary of the Upper Yangtze, flowing into it at Chungking. At a distance of 48 miles up this river from Chungking is the town of Ho chau, and here the Kia ling is joined by the Fu ho from the northwest; a few miles farther northward the Kialing is joined by the Kii ho, flowing into it from the northeast.

The To kiang joins the Upper Yangtze from the northwest at Lu chau, about 125 miles above Chungking; it is probably navigable for small craft at high river nearly to Nei kiang, but is unnavigable at low river.

The Min joins the Upper Yangtze from the northwest at Sui fu; it is probably navigable at high river to Kiang kau, a distance of 167 miles, but at low river only to Kiating fu, a distance of 95 miles.

The Grand canal extends from Hangchau for 700 miles to Tientsin; it is in some places out of repair.

Whang ho, or Yellow river, is but little inferior to the Yangtze in magnitude, being nearly 2,500 miles long, but it is unnavigable for ships, and is one of the most unmanageable rivers in the world and of little utility. It is a characteristic river of the loess region, with a broad, shallow course which is apt to change. It owes its color and name to loess sediment. Well called China's sorrow, it has on many occasions caused widespread disaster and loss of life by bursting its banks and inundating an immense area, and at the same time changing the last 350 miles of its course through an angle of about 60°, sometimes entering the sea southward of Shantung promontory, and sometimes northward of it, as now. In its course through the plains there are accordingly few important towns on its banks.

Pei ho, or White river, called also the Peking river, is the largest stream between the Yellow river and the Great wall; it drains the great plain southward of the table-land and eastward of Shensi, and its various branches afford water communication through the province of Chihli. Its length from its source to the sea is about 279 miles. From the end of November until early in March it is closed by ice.

Liao ho, at the head of Liaotung gulf, is about 650 miles in length; on it near its mouth is the treaty port Yingtze, or Newchwang port, which can be reached by vessels of 17 feet draft in summer; large junks ascend the river 30 miles, and small junks 200 miles, from the sea.

The Liao flows through the great plain of Manchuria; its most important affluent comes from Mongolia, where it is called the Sira muren, or Yellow water; but the greater volume of its waters is drawn by many affluents from Manchuria. The river is muddy, for it runs a sluggish course through rich loam, with some of which it is always loaded, and consequently the land at its mouth is encroaching on the sea. This river is full of mercantile life; many thousand boats, each manned by from 2 to 7 men, cover its surface and that of its three principal affluents, with almost continuous lines of white sails, carrying down the enormous stores of grain accumulated every autumn in the north. The river is frozen from November to the middle of April.

Tsien tang kiang is noticeable on account of the city Hangchu fu, formerly the capital of China, being situated about 2 miles from its left bank at 20 miles within its entrance, and also from the bore which occurs in it. It is used only by small, flat-bottomed junks drawing 2 feet.

Yung river is small, but important from the fact of the treaty port Ningpo being situated on its banks at 12 miles from its mouth, in Lat. 30° N.

Min river is chiefly important to shipping from the city Fuchau fu, a treaty port on its banks at about 32 miles above its entrance, from which much tea is shipped for Europe and America. The river is crossed by a substantial stone bridge at Fuchau fu, but ships drawing over 11 feet can not ascend nearer the city than Pagoda anchorage, about 9 miles from it.

Ou kiang, the mouth of which is in Lat. 28° N., has on it at 30 miles up the river the treaty port Wenchau fu, and 150 miles farther the city Hung chuen (Dragon spring), the source of the river.

Han river derives its waters from two branches, one of which flows eastward from the mountains in the middle of Kuangtung province whilst the other flows southward from Fuhkien province. Uniting at San ho pa, in Lat. 24° 24′ N., Long. 116° 34′ E., with a third less important stream, they form the river, which, flowing past Chau chu fu, and expanding below that city, continues through a fertile delta to the sea in Lat. 24° 20′ N. Within its entrance is the treaty port Swatau.

Chu kiang, or Pearl river, commonly called **Canton river,** rises about 30 miles northward of Canton, or 100 miles from the sea, in two streams, which unite at 10 miles above that city; at this junction a long, narrow stream connects it with the Pe kiang, or North river, by two branches, one to Sam shui, the other to 15 miles above that place. Tung kiang, or East river, which falls into the Chu kiang above Second bar, drains a large central portion of Kuangtung province, a sugar district.

The Chu kiang is connected by several channels with the Si kiang, or West river.

Si kiang, or West river, the large river of southern China, commences at the confluence of the Yu kiang with the Wu kiang, in about Lat. 23° 30′ N., Long. 110° 00′ E. The general course of the Si kiang is easterly, but in about Long. 112° 50′ E. it divides into several channels and turning southeastward and southward forms a wide delta.

The Wu, or Hong kiang, one of its princiapl tributaries, rises in Yunnan and flows southward and eastward through Kuangsi till it joins the Si kiang. Its principal contributory streams are the Liau chau fu, Yung fu, and the I kiang.

The Yu kiang rises in Yunnan in about Long. 105° E.; on it is the important city of Nanning fu.

Below the confluence of the Wu, or Hong kiang, the principal tributaries of the Si kiang are the Kweiling ho and the Pe kiang.

Climate.—With a length of coast stretching from the Tropics to Lat. 41° N., a general summary of the climate would perhaps tend to mislead. It may, however, be stated that the summer months are abnormally hot and the winter months abnormally cold throughout the Empire, considering its situation.

Products.—Southern China is the land of rice, tea, sugar, opium, silk, indigo, and other tropical and subtropical products; northern China, of wheat, millet, cotton, and pod fruits. Some of these are spread all over the Empire; thus, opium is now grown in all the provinces, and rice is cultivated in the extreme north. Silk is most abundantly produced in Kiangsi and Chehkiang, next in Kuangtung. The most important tea districts are all south of the Yangtze, but tea is also largely grown in western Szechuen, north of that river. Kitchen vegetables, various oil plants, and tobacco are generally grown. Live stock are few where the population is dense; dairy farming is unknown, but poultry abound.

Coal fields cover an area at least five times as large as the coal fields of Europe. In 1903 a British company at Kai ping mined 700,000 tons; the Feng tae mines yield 300 tons a day. Iron, copper, silver, and lead also occur.

Numerous gums and varnishes, cassia, musk, the precious metals, gems, mercury, arsenic, and the finest porcelain clay are among the products of the Empire, the principal mines being in Kueichau and Yunnan.

Manufactures are of very varied, and often of most exquisite, description; Chinese porcelain, silks, embroidery, and lacquered wares are unequaled for brilliancy, richness, and durability; and the Chinese excel in carved goods, tortoise shell, ivory, and horn, in engraving, the manufactures of paper, ink, cabinetwork, and bell casting.

Commerce.—The chief imports are opium, cotton and woolen stuffs, kerosene, ginseng, and rice; and the exports are tea, silk and silk manufactures, sugar, straw braid, hides, paper, skins and furs, cotton, beans, and bean sake.

In 1906 the net imports amounted to $337,618,090 and the exports to $194,584,190.

Winds.—The prevailing winds on the coasts of China are closely allied to the barometric pressure over the continent of Asia. In the cold season an area of high pressure exists over the Asiatic continent which produces an anticyclonic circulation of the wind, in which the wind revolves round the high-pressure area in the direction of the motion of the hands of a watch, with a slightly outward spiral movement. In the hot season an area of low pressure exists over the Asiatic continent, which produces a cyclonic circulation, in which the wind revolves round the low-pressure area in the direction contrary to the motion of the hands of a watch and with a slightly inward spiral movement. These systems of pressure, due to·the contraction and consequent weight of the air in the cold weather and its expansion and lightness in the hot weather, cause the northeast and southwest monsoons, the strength of which in any particular area is due to the barometric gradient at that locality. Thus, in winter, when the barometric gradient is steep on the coasts of China, the northeast monsoon is very strong there, while it is comparatively weak in the bay of Bengal and Arabian sea, where the gradients are slight; whereas in summer, when the gradients are steep over India and moderate on the coasts of China, strong southwest winds prevail in the Arabian sea and bay of Bengal, and moderate southwest winds in the China sea.

The southern portion of the region described in this volume is within the influences of the northeast monsoon, which prevails from October to April, and the southwest monsoon, which prevails from May to September, inclusive.

Generally in the northern part of China, which is without the limits of the northeast trade wind, the influences of the monsoons prevail, and the periods of northerly and southerly winds are the same as those of the monsoons, though they are much diminished in regularity, and broken by calms and variables, especially in summer.

The northeast monsoon is by far the stronger of the monsoons; it is the more steady and lasts longer. It occasionally sets in as early as the last week in August, but it usually begins in the northern part of the China sea about the end of September or early in October. This monsoon generally, and sometimes without warning, commences with a gale which frequently lasts 10 or 12 days and blows with great violence; therefore, when the monsoon is about to change, do not anchor in unsheltered positions, and weigh immediately the wind freshens, as otherwise, owing to the swell rising quickly, there is difficulty in getting the anchor. Although the weather is sometimes settled and fine during September and October, storms frequently occur in those months.

In November the northeast monsoon prevails generally; but it blows more steadily, and with greater strength, in December and January; the weather then is frequently cloudy, with much rain and a turbulent sea, but there are considerable intervals of fine weather.

In February there are generally strong winds and unsettled weather, moderate breezes and settled weather being exceptional. During March the wind is moderate, with steady weather all over the China sea, and land and sea breezes on the coast of Luzon. In the northern part of the China sea April is considered the finest month, and during May northeast and southwest breezes alternate.

Northward of Formosa the northeast monsoon prevails from about September to May, inclusive, but easterly or southeasterly winds are frequently experienced during this monsoon.

The southwest monsoon is regular in the China sea, but northward of a line from Hongkong to the northwestern part of Luzon it seldom blows with much strength, except during June, July, and August, when it prevails more or less all over the coasts of China, and extends eastward approximately to Long. 145° E., often accompanied by rain and cloudy weather. It generally commences about the middle or end of April, and continues to the beginning or middle of October, subject to an acceleration or retardation of about a fortnight.

Gulfs of Pe chili and Liaotung.—The prevailing winds between October and March, inclusive, are from the northern semicircle, but with frequent interruptions. Heavy northeasterly and northerly gales, accompanied by snow and bitterly cold, are experienced.

The prevailing winds between April and September are light and variable from the southern semicircle. There is scarcely any rain in summer. In the gulf of Pe chili, westerly winds are laden with dust, which is extremely irritating to the nostrils and eyes, and obscures the land at a distance of 4 miles.

About the end of September and the early part of October the weather is sometimes very changeable, with strong northwesterly winds which lower the water in the gulf 1½ feet.

The barometer gives no warning; sometimes it rises for a northerly or for an easterly gale with snow, and, on the contrary, sometimes it falls for either.

There are gales sometimes during summer, but they are more of the character of very strong breezes, and rarely last 12 hours, during which time they shift considerably; southwesterly gales are steady; northwesterly gales usually commence with a light easterly wind. In October and November rotary gales, usually commencing at east-northeast, blowing strongest from the northwest quarter, and moderating at west-northwest, are more frequent, often continuing 2 or 3 days, with a force of 8 to 10. The steady northwesters do not seem to blow beyond the Shantung promontory.

Shantung coast.—The winds during spring and summer are variable, and there is but little rain. Easterly winds bring rain and gloomy weather; southerly winds fog. After May the winds along the coast become more variabe, light easterly winds prevailing with very dry weather; gales or strong winds are rare and seldom last twelve hours. Sudden and heavy squalls and thunderstorms occur in summer. A quick fall of the barometer with an easterly wind is an almost sure indication of a short gale, which sometimes does not commence till the barometer has risen considerably.

Hwang hai, or Yellow sea.—Near the land the winds throughout the greater part of the year are local. Between Shanghai and Korea, in December and January, it blows almost constantly from the northwestward, seldom ranging beyond north and west-southwest, with north-northwesterly gales of long duration, the weather being sometimes fine, but generally overcast and gloomy with rain. Off the coast of China the wind follows more the trend of the land, and sometimes a fresh north-northeasterly wind blows almost incessantly until the end of February, when it becomes more easterly.

Snow is rare at Shanghai, but the mountains and coasts of Shantung and Korea are covered with it in January, February, and part of March, and the high lands remain covered later.

Tung hai, or Eastern sea.—Between the parallels of Lat. 25° N. and 30° N. northeasterly winds prevail throughout the year, but alternate with calms; variable and southwesterly winds during summer.

Farther northward, in spring and until June, moderate easterly winds prevail which, generally, when the wind shifts a little northward, bring rain and drizzle; there are also occasional stiff northeast breezes.

Southwest winds occur rarely, but bring fine weather for short intervals.

Later in the season the winds are variable, chiefly southeast, with occasional northwest breezes. Early in September, east-northeast to south winds prevail; strong easterly gales are very unusual.

Coasts of Formosa.—The northeast monsoon begins on the east coast in October and blows steadily until April, the wind being generally much more moderate near the land than in the offing; it is often very violent in the strength of the monsoon. The so-called "southwest monsoon" seldom sets in until May, between which month and July east and southeast winds prevail; very fine weather is generally experienced between June and September, the southwest monsoon being a gentle breeze.

On the west coast of Formosa, from October to April, the northeast monsoon is fresh and varied with gales, although generally more moderate and fine on its southern part. In summer gentle southwesterly winds and calms prevail, the breeze blowing home to the coast, but not beyond, with rarely even a short gale. In July, August, and September there are often strong northeasterly winds. Northward of the Pescadores southwest winds do not set in until May, when they alternate with strong northeast winds. On the northern coast these alternating winds continue into June, and the northeasters blow very fresh and bring in a remarkable dark haze, the wind shifting between northeast and northwest and lasting about 3 days. The northeast monsoon blows on the north coast nearly 9 months in the year. In Formosa strait there are often strong northeasterly winds in July, August, and September.

Coast of China.—On the coast between the Canton river and about Lat. 25° N., the northeast monsoon is strong from November to January; in October, November, and December the weather is tolerably fine; from January to March there is a great deal of cloud and fog; in April and until the middle of May the wind is intermittent; sometimes it changes to south, when the weather becomes thick and squalls follow from northeast, and in this season strong gales, with rising barometer, are frequently experienced, especially in Formosa strait, while a low barometer generally indicates a southerly wind. During the height of the northeast monsoon the wind at night frequently draws off the land all along the east coast.

In the southwest monsoon the winds are not so constant in direction; land and sea breezes occur near the land, so there is nothing like the difficulty in getting southward against the southwest monsoon that there is in getting northward during the northeast monsoon. On the southeastern coast of China and southerly and south-southeasterly winds are frequent during the southwest monsoon.

Typhoons.—The cyclonic storms of the China sea and the seas between China and Japan have long been named typhoons, after a Chinese word meaning great wind.

The wind in these storms is precisely similar to that in all revolving storms in the northern hemisphere. It revolves around the central area of low pressure in the direction contrary to the motion of the hands of a watch, curving also spirally toward the center; and at the same time the whole storm field advances, sometimes with great velocity and sometimes scarcely more than a few miles an hour.

The average rate of progress of the center of a typhoon in Lat. 11° N. is 5 miles an hour; in Lat. 13° N., 6½ miles; in Lat. 15° N., 8 miles; in Lat. 20° N., 9 miles; in Lat. 25° N., 11 miles; in Lat. 30° N., 14 miles. Southward of Lat. 13° N. the rate does not vary perceptibly, but it is more variable the farther to the northward, and in Lat. 32° N. it ranges from 6 to 36 miles.

The area over which these storms extend varies from 20 to some hundreds of miles in diameter, and near land the strong winds are so irregularly distributed that in a place near the center there may be less wind than at some distance farther away from it.

Typhoons are experienced in the China sea, northward of about Lat. 9° N.; over the Philippine Islands; in Balintang and Bashi channels, eastward and westward of Formosa; between Formosa and Japan; and on the coasts of Korea. They are most frequent in the vicinity of Luzon, Hainan island, and southwestward of Japan.

Amoy, Fuchau, and the coast between those ports are comparatively free from them, but one or two a year cause danger to vessels in that region.

Typhoons occur principally between May and November, and are most frequent in September. Although rare at other times, they have been recorded in every month in the year. Between May and November these storms commonly follow each other quickly, and there are often several raging at one time; then they cease, and there are none perhaps for several weeks, but in August and September a total cessation is most unusual.

In the 13 years previous to 1898, 244 typhoons were registered, or an average of 19 yearly, which were distributed thus: January, 1; February, 0; March, 1; April, 4; May, 10; June, 24; July, 45; August, 43; September, 57; October, 31; November, 22; December, 6.

The track which the center of the storm follows is known as its path, and that part of the storm on the right of the path, as it advances, is named the right-hand semicircle, and that on the left, the left-hand semicircle.

The right-hand semicircle is called the dangerous semicircle, because a vessel in it may possibly be driven across the path of the storm, and would certainly cross it if she ran before the wind; also the recurvature of the path, or its change of direction to northeastward after having moved northwestward and northward, is always toward the side on which it is situated.

The best and surest of all warnings is given by the barometer. In every case there is great barometric disturbance; therefore if the barometer is unsteady, or even if the regularity of its diurnal variation be interrupted, danger should be apprehended.

The barometer, owing to the daily variation, rises from 4 a. m. to 10 a. m., falls from 10 a. m. to 4 p. m., rises from 4 p. m. to 10 p. m., and falls from 10 p. m. to 4 a. m. The amount of the daily variation is twice as great at midwinter as it is at midsummer. During the approach of a typhoon this regular variation may be masked, but it goes on all the same, and must be taken into account when the barometer begins to fall.

In the China seas between Lat. 9° N. and 31° N. it is advisable to assume every barometric disturbance in summer to indicate a typhoon.

The earliest signs of a typhoon are clouds of the cirrus type, looking like fine hair, feathers, or small pale white tufts of wool, traveling westward and backing southward, a slight rise in the barometer, clear and dry but hot weather, and calms or very light winds. If cirrus comes from the west there is no typhoon; if from the south then there may be a typhoon more than 600 miles to the southward. This fine weather lasts for days, the existence of a typhoon at a great distance causing fine weather all around.

The cirrus clouds appear within 1,500 miles of the center of a typhoon; the barometer is generally rising beyond 600 miles from the center. Halos around the sun and moon, phosphorescence of the sea, and beautiful sunsets, with grand twilight rays, appear to be frequently noticed before typhoons.

These signs appear to be very familiar to Chinese seamen and fishermen, and their vessels may often be seen running for a typhoon harbor before there are signs sufficient to alarm an ordinary European navigator. When the native craft are thus seen making for shelter during the typhoon season the mariner should take all precautions.

An increasing swell occurs from 300 to 600 miles from the center, or farther off, but this depends greatly on the situation of the nearest land, and particularly upon whether land intervenes between the ship and the typhoon center. The swell arises from the heavy seas which accompany a typhoon and form the real danger to ships. The bearing of the center is not well determined from the swell. A heavy cross swell is a certain indication of a typhoon, except near rocky land, where a cross swell may be caused by reflection of the direct swell. The cross swell arises from the heavy confused cross seas raised by strong winds from different directions around the center.

Within 600 miles of the center the sky is often half overcast with cumulus, above which there is cirro-cumulus, the sky being frequently paled by high and faint cirro-stratus.

Nearer than 500 miles from the center the cloudiness increases and the barometer begins to fall slowly, seldom as much as a tenth of an inch in 24 hours. The air becomes oppressive and the sky presents a threatening and vaporous appearance.

Between 200 and 400 miles from the center there is a heavy cross sea, which gets up some time before and lasts longer than the wind. The sky becomes overcast about 250 miles in front of the center.

Within 200 miles of the center the temperature falls quickly, owing to the heavy roll cumulus with which the sky is densely clouded. About this distance in front of the center the air sometimes becomes abnormally dry, and the sky presents a peculiar black and ominous appearance. The wind generally has the force of a strong breeze, rising to a moderate gale in the squalls; but this depends also on the bearing of the center, the wind being usually strongest in the right-hand semicircle.

Within 200 miles northward of, and 150 miles in front of and southward of, the center, heavy rain begins to fall, and from 150 to 60 miles from the center it is torrential.

Within from 2 to 15 miles from the center it becomes calm, or nearly so, and the sky usually clears overhead, more or less, being covered only by light clouds, or haze, through which the sun or brighter stars are visible.

The sea is, as a rule, very heavy and confused, but sometimes near land it moderates when the diameter of the calm area exceeds 20 miles. The center of the calm area does not always exactly coincide with the lowest barometric pressure.

Very deceitful lulls occur during the raging of a typhoon, which sometimes last long enough to be mistaken for the central calm.

The approach to the center is judged by the fall of the barometer and the increase in the strength of the squalls, but no conclusions can be made with certainty.

The force of the wind is different according to the dimensions of the typhoon. On an average it is force 12 within 35 miles of the center; force 11 at 50 miles; force 10 at 75 miles; force 9 at 110 miles; force 8 at 145 miles; force 7 at 180 miles; force 6 at 220 miles; and force 5 at 250 miles; but it often blows force 6 at 300 miles from the center, and then the area of strong wind is larger.

The diameter of the calm in the center of a typhoon in a low latitude in summer is about 4 miles; farther northward or late in the year it reaches sometimes 40 or 50 miles.

In many typhoons the barometer, reduced to 32° F. and sea level, does not fall below 28.8 inches; in others it falls to 28.5; it rarely falls lower, but sometimes it falls much lower.

The steepest barometrical gradient usually met with is 0.33 inch in 15 miles.

The incurvature, or the angle between the wind and the bearing of the center, depends to some extent on the distance from the center, but it is about 11 points in front of the center, 11 points to the right, 12 points in rear of the center, and 11½ points to the left. In Lat. 30° N. the average angle is about 10 points.

Paths.—Typhoons usually take one of the following tracks:

1. They may originate in the China sea in about Lat. 15° N., most frequently about Lat. 18° to 20° N., and Long. 113° to 116° E., and move toward Hainan or Annam, or approach the mainland westward of Hongkong. Typhoons of this class prevail from the middle of June to the end of September.

2. They may originate in the Pacific and enter the China sea and approach the mainland westward of Hongkong. These prevail from the beginning of July to the middle of October.

3. They may originate in the Pacific and enter the China sea northward of Lat. 15° N., thence moving southwestward and disappearing at sea. Only one or two cases of this kind, which occurred late in the year, have been registered.

4. They may originate in the China sea and move northward describing very different tracks in directions between west, through north, to east-northeast. Sometimes they recurve on entering the

mainland. These occur from June to the end of September, but they are most common at the beginning of the typhoon season.

5. They may originate in the China sea, recurve and move into the Pacific, passing near the southern end of Formosa. These occur from May to September, inclusive.

Typhoons of classes 1 and 4 (forming 26 per cent of all) are frequently felt at Hongkong.

6. They may originate in the Pacific, enter the China sea northward of Lat. 15° N., and reach China eastward of Hongkong, thence moving northward or westward. These occur in July, August, and September.

7. They may originate in the Pacific and move into Formosa strait. Instances of such movements occur from June to September, but are most common in August and September.

8. They may originate in the Pacific, and pass northward of Formosa, and reach the coast of China. These occur from June to September.

9. They may originate in a high latitude in the Pacific and move west-northwestward toward China.

Some typhoons originate and rage mainly in the Pacific.

Directions.—The course that a vessel must pursue when expecting or encountering a typhoon depends in a great measure on local circumstances; if possible to reach a safe anchorage it is well to do so, and remain there until the storm has passed; if this is not possible the following rules should be carefully considered.

Practical rules.—In the typhoon season be constantly on the watch for the premonitory signs, and carefully observe and record the barometer.

When there is reason to believe that a typhoon is approaching, the two points necessary for the seaman to know are the direction of the center of the storm, and in which semicircle the vessel is situated.

In order to ascertain these two points it is necessary for the observer to be stationary; the first thing, therefore, to be done is to stop head to wind, or to heave-to, and as it is always wise to assume that the vessel may be in the right-hand or dangerous semicircle she should be hove-to on the starboard tack.

There should be no hesitation in heaving-to, as the sooner a clear knowledge of the position of the vessel in the storm is ascertained the better it will be.

When hove-to the bearing of the center, if facing the wind, is from 12 to 8 points on the right hand; at the beginning of the storm allow 12 points, when the barometer has fallen 0.3 inch, about 10 points, and when it has fallen an inch or upward, 8 points.

Having ascertained the bearing of the center, the semicircle in which the vessel is situated is found by observing the direction in which the wind shifts. If it shifts to the right, the vessel is in the right-hand semicircle; if to the left, in the left-hand semicircle; and if the wind is steady in direction, but increasing in force, with a falling barometer, the vessel is in the direct path of the storm.

If a vessel is in the direct path of the storm, the best course to pursue is to run with the wind on the starboard quarter until the barometer ceases to fall.

If the vessel is in the right-hand semicircle, she should remain hove-to on the starboard tack as the wind will draw aft.

If the vessel is in the left hand semicircle run with the wind on the starboard quarter until the barometer begins to rise.

NOTE.—If the vessel is within a point, or even two, of the path of the center, it is generally impossible to know in which semicircle the vessel is situated, as the wind does not change much, and such change as there is often takes place in a misleading way; in this case it is advisable to run with the wind on the starboard quarter as early as possible.

If it is necessary for a vessel in the left-hand semicircle to heave-to, she must heave-to on the port tack.

In receding from the center of a typhoon, after the barometer has reached its lowest point and begins to rise, there usually is as much bad weather, if not more, to be passed through as there has been while it has been falling, although the weather is on the whole improving.

It should be remarked that in some cases vessels may, if the storm is traveling slowly, sail from the dangerous semicircle across the front of the storm, and thus out of its influence. But as the rate at which the storm is traveling is quite uncertain, this is a hazardous proceeding, and the seamen should hesitate and carefully consider the case, particularly the rate at which the barometer is falling, before attempting to cross.

Typhoon harbors.—At the following anchorages vessels lie securely in a typhoon: Canton river above Lintin; Hongkong harbor and anchorages in the vicinity; Mirs bay; Swatau; Namoa island (abreast Stewart's house); Tongsang harbor; Amoy harbor; Quemoy island; Makung harbor in the Pescadores islands; Ke lung and Tamsui harbor in Formosa; Hunghwa sound; Hai tan strait, south entrance; Pi kwan harbor; Bullock harbor; anchorage northward of Takiu island; Little pass (for a single vessel).

In the Chusan archipelago, Ting hai outer and inner harbors; Chang tau harbor; Sinkeamun harbor (for small vessels); and Ta utze harbor on the northwest side of Kintang.

Gales.—Northeasterly or east-northeasterly gales sometimes blow steadily for several days at a time, in September or October, near the southeastern coast of China.

In the northern part of the China sea, fresh northerly gales of 3 or 4 days' duration sometimes occur in December or January, with a high barometer and dirty weather.

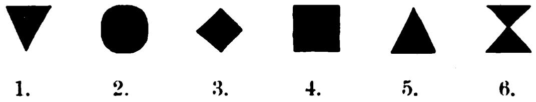
A violent southwest squall or sharp gale of 4 hours' duration has occurred at Hongkong in January, causing great damage to native craft and foreign vessels to drag or lose their anchors; it was preceded for an hour or two by incessant lightning.

From Hongkong northward to the parallel of Lat. 30° N. moderate fresh northeast gales with rain occur up to June, but they are not generally so heavy as those which prevail during the northeast monsoon.

Strong northeast gales are sometimes experienced from May to September, during the southwest monsoon.

Typhoon and storm signals.—The undermentioned system of typhoon and storm warning signals is in use at the semaphores of the imperial maritime customs at Swatau, Amoy, Fuchau (Pagoda anchorage), Gutzlaff island, Wusung, Shanghai (storm-signal station), Chinkiang, Chifu, Taku (Tientsin), and Newchwang. The system is also used at the storm-signal stations at Wei hai wei and Tsing tau.

The signals are made by means of shapes used as symbols having numbers corresponding to them as follows:



These shapes are hoisted at the yardarms of the signal mast and have the following general characteristics:

Typhoon and continental depressions:
  3 shapes at one yardarm showing the position of the center.
  2 shapes at the other yardarm showing the direction towards which the center of the typhoon is moving.
  1 shape at the masthead to indicate the time the warning was issued from Zi ka wei.

Gale signals:
  2 shapes at one yardarm showing the general direction of the wind.
  1 shape at the other yardarm showing the region threatened.
  1 shape at the masthead to indicate the time the warning was issued from Zi ka wei.

The time the warning was issued from Zi ka wei observatory is indicated by one of the above-mentioned shapes hoisted at the masthead, as follows:

Signal.	Signification.
No. 1 (cone, point down)	Warning issued this afternoon.
No. 2 (ball)	Warning issued this morning.
No. 3 (diamond)	Warning issued yesterday afternoon.
No. 4 (square)	Warning issued yesterday morning.

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TYPHOONS AND CONTINENTAL DEPRESSIONS.

I. THREE SYMBOLS.—*Representing approximate position of center.*

Series 1 – ▼		Series 2 – ●		Series 3 – ◆	
Southeast district.		Southwest district.		South-central district.	
No.	Meaning.	No.	Meaning.	No.	Meaning.
111	Caroline islands (Pelew, Yap).	211	Off the coast of Cochin-China.	311	East of Liu kiu islands.
112	Mariana islands (Guam).	212	Southwest of the Paracels.	312	Central Liu kiu islands.
113	Between Mariana and Bonin islands.	213	Off Tourane bay (Annam).	313	Southeast of Liu kiu islands.
114	Far to the east of Philippine islands.	214	Between Paracels and Hainan.	314	South of Liu kiu islands.
115	Southeast of Luzon.	215	Between Hainan and Annam.	315	Southeast of Meiaco Sima group.
116	South of Luzon.	216	East of Hainan islands.	316	South of Meiaco Sima group.
122	Sulu sea.	222	Tong King gulf.	322	North of Meiaco Sima group.
123	Southwest of Luzon.	223	Off the Delta of the Song Ka.	323	West of Liu kiu islands.
124	East of Luzon.	224	Hainan strait.	324	Southeast of Formosa.
125	Central Luzon.	225	Southeast of Hongkong, beyond 200 miles.	325	Balintang channel.
126	West of Luzon.	226	Southeast of Hongkong, within 200 miles.	326	Bashee channel.
133	Northeast of Luzon.	233	South of Hongkong.	333	Southwest of Formosa.
134	Northwest of Luzon.	234	Southwest of Hongkong.	334	East of Formosa.
135	West of Paláwan islands.	235	South of Formosa Channel.	335	Central Formosa.
136	Southeast of Macclesfield Bank.	236	Coast near Macao.	336	Northeast of Formosa.
144	South of Macclesfield Bank.	244	Coast near Hainan.	344	North of Formosa.
145	South of Paracels.	245	Northwest of Hongkong.	345	Center of Formosa channel.
146	East of Paracels.	246	Off Swatow.	346	North of Formosa channel.
155	Central Paracels.	255	Off Amoy.	355	Off Turnabout island.
156	Northeast of Paracels.	256	Coast south of twenty-fifth parallel.	356	Off Fu chau.

Series 4 — ■		Series 5 — ▲		Series 6 — ⧗	
North-central district.		Northern district.		Continental depressions.	
No.	Meaning.	No.	Meaning.	No.	Meaning.
411	Northeast of Liu kiu islands.	511	Southeast of Yezo island (Hokkaida).	611	Si-kiang valley.
412	Northwest of Liu kiu islands.	512	Northern part of Sea of Japan.	612	Upper Yangtse valley.
413	South of Kiusiu island.	513	East of Nipon.	613	Mean Yangtse valley.
414	Off Tung Yung light-house.	514	Central Nipon.	614	Lower Yangtse valley.
415	Southeast of Wenchau.	515	West of Nipon.	615	Upper Hwang-ho valley.
416	Southeast of Hie-shan light-house.	516	Southeast of Nipon.	616	Lower Hwang-ho valley.
422	Coast of Che-kiang.	522	Approaches to Kii channel.	622	North of China.
423	Southeast of Chusan islands.	523	Approaches to Bungo channel.	623	West of Lake Baikal.
424	Southeast of Gutzlaff light-house.	524	Southwest of Kiusiu.	624	South of Lake Baikal (Mongolia).
425	Off the Saddle islands.	525	West of Kiusiu (Nagasaki).	625	East of Lake Baikal.
426	South of Shanghai.	526	Korea strait, Kiusiu.	626	North Liau tung.
433	Southwest of Shanghai.	533	East of Korea.	633	Shantung.
434	East of Shanghai.	534	Southeast of Shantung.	634	Korea.
435	West of Shanghai.	535	Southeast of Tsin tau.	635	Eastern Manchuria.
436	Northeast of Shanghai.	536	South of Tsin tau.	636	Yellow sea.
444	Northwest of Shanghai.	544	East of Shantung.	644	Sea of Japan.
445	North of Shanghai.	545	Northeast of Shantung.	645	Eastern sea.
446	Between Saddle islands and Quelpart island.	546	Pechili strait.	646	Japan.
455	Central Yellow sea.	555	Gulf of Pechili	655	Yezo Island (Hokkaida).
456	Coast of Kiangsu.	556	Liau tung gulf.	656	East of Nipon.

II. Two Symbols.—*Representing direction toward which center is moving.*

▲	▲	■	▼	▼	▼
▲	■	■	■	▼	●
North.	N. E.	East.	S. E.	South.	S. W.

●	▲	◆	⧗	◆	⧗
●	●	◆	⧗	⧗	◆
West.	N. W.	Recurving.	Steady or slow.	Filling up.	Unknown.

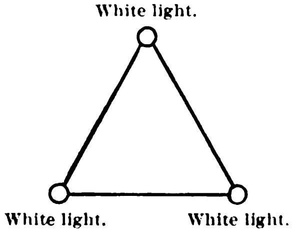
III. Gales.—One Symbol.—*Representing locality.*

▼	Coasts of the Philippine islands; China sea south of Pratas reefs and east of the Paracels.
●	Coast of Indo-China; gulf of Tong King; China sea west of the Paracels.
◆	Formosa island and channel, coast of China between Swatau and Wenchau.
■	Approaches to the Yang-tze-kiang; Saddle islands; southern part of Yellow sea.
▲	Gulf of Pechili, coasts of Liau-tung and Shantung; northern part of Yellow sea.
⧗	Sea and coasts of Japan; east and south of Korea; Liu kiu islands.

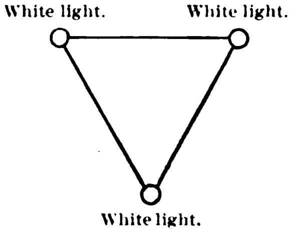
Note.—The direction of the wind is signaled as in Table II.

IV. Night Signals.

A.—GALES.

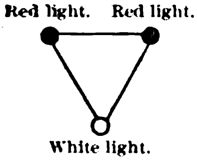


Gale expected on the coast north of the thirtieth parallel.



Gale expected on the coast south of the thirtieth parallel.

B.—TYPHOONS AND DEPRESSIONS.



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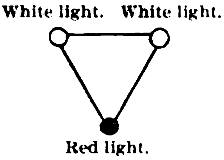

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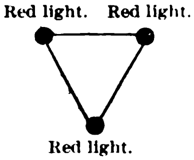

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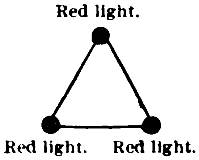

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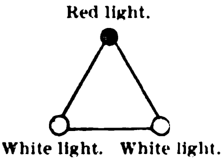

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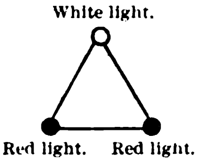

6.

These signals are used in the same manner as those in Table I of the code to indicate the approximate position of the center.

NOTE.—At Shanghai further information regarding storms signaled may be obtained by inspecting the weather chart and consulting the daily bulletin at the Zi ka wei observatory's storm-signal station on the Quai de France.

CURRENTS.—In the northeast monsoon, on the southern coast of China, the current runs almost constantly west-southwestward, nearly parallel to the land, at the rate of 18 to 48 miles a day, according to the strength of the wind, and sometimes, on the occurrence of a typhoon or gale, its rate is greatly increased. Between Formosa and the coast of China the current runs southwestward at the rate of 18 to 54 miles a day, according to the strength of the monsoon.

In the southwest monsoon, on the southern coast of China, the current generally runs northeastward at the rate of 18 to 42 miles a day, but it is much governed by the wind. Between Formosa and the coast of China the rate of the current setting northeastward averages 30 to 42 miles a day, but it varies from 1 to 3 and even 4 miles an hour, according to the force and duration of the wind. The current must be especially allowed for when hove-to off a port or running for one in thick weather, for vessels have run into Hu i tau bay instead of Amoy. This drift current blends with the Japan stream northeastward of Formosa. The effect of the current is increased or reduced near the land by the tidal streams, but the resulting stream seldom runs southward in the southwest monsoon or northward in the northeast monsoon.

Tung hai or Eastern sea and Hwang hai or Yellow sea.—Outside the influence of the tidal streams the currents in these seas northward of about Lat. 30° N. appear to be principally caused by the prevailing winds; they are usually weak, but obtain a rate of 18 to 30 miles a day.

Tides.—The tidal wave causes high water on the eastern coast of China, from Hongkong to Chusan, at nearly the same absolute time; it being high water, full and change, in the vicinity of Hongkong at about 9h. 0m., and at the outer islands of the Chusan archipelago at 9h. 44m. local times. The rise and fall, however, varies considerably, being much greater to the northward than in the vicinity of Hongkong; the rise is 5 feet at the Ninepin group; it is 7 feet at Namoa island, 12 feet at Tongsang, and 18½ feet at Amoy; between Amoy and Min river it varies from 16 to 18 feet at springs, but on the south side of Haitan strait spring tides rise 18 to 23 feet.

When the sun has north declination the higher tides about springs occur during the day, and when it has south declination, during the night.

It is high water, full and change, at Shaweishan island, at the entrance of the Yangtze kiang, at 11h. 22m., and at Sang kau bay, at the southeastern part of Shantung peninsula, about 1½ hours later, but in the great intervening bight of the coast to the westward it becomes fully 6 hours later. The rise and fall at springs off the Yangtze is 14 feet, at Kyau chau bay 12½ feet, and at Shantung promontory 7 feet.

The maximum tidal rise in the Yellow sea occurs at Masanpho harbor, on the Korean coast, where it is 30 feet; the minimum rise is at Aylen bay, in about the same latitude on the coast of Shantung, where it is 6 feet.

Ice may be experienced in the gulfs of Pe chili and Liaotung from the middle of November to the end of March; January and February appear to be the months when the most severe cold may be expected.

In October the temperature of the sea falls 20°, and sharp frosts frequently occur at night; at the end of October snow falls in the northern part of Liaotung gulf, and at the end of November, at the entrance of the Pei ho, severe frosts and snow accompany northerly and easterly gales. Thin ice now rapidly forms at low tide on the extensive mud flats and is carried by the flood into the rivers, which are frozen up about the middle of December. The ice becomes compact and fills the head of the gulf of Pe chili within a line south-southwestward from Shaliutien banks.

In January field ice 23 miles in extent and half a foot thick was passed through southeastward of Taku. Early in February floating ice has been met at 120° 75 miles from Taku, and at 32 miles from that place the ice was packed and of 20 to 30 inches in thickness; detached masses of ice were carried along the coast of Sha lui tien island by the current, while inside the island the ice appeared to be permanent.

Uniform system of buoys and beacons.—The following system of buoys, beacons, and distinguishing marks of wreck-marking vessels is adopted in Chinese waters:

The side of the channel is to be considered starboard, or port, with reference to the entrance to any port from seaward.

Buoys.—Buoys painted red mark the starboard side of the channel, and must be left on the starboard hand by vessels entering.

Buoys painted black mark the port side of the channel, and must be left on the port hand by vessels entering.

Buoys painted in red and black horizontal bands mark the fairway, and should be passed close-to.

Buoys painted in red and black vertical stripes mark the ends of spits, and the outer and inner extremes of banks, shoals, or extensive reefs, where there is a navigable channel on either side of such bank, shoal, or reef. Vessels must not attempt to pass between a buoy thus painted and the danger it marks.

Buoys painted red and black checkered mark rocks in the open sea, and also obstructions of small extent having channels on either side of them. When marking the latter they are placed seaward of the danger. Vessels must not attempt to pass between a buoy thus painted and the danger it marks.

When two checkered buoys—red and white and black and white—mark an obstruction, the red and white buoy marks the starboard side of the channel, and must be left on the starboard hand by vessels entering; and the black and white buoy marks the port side of the channel, and must be left on the port hand by vessels entering.

Wrecks are in all cases marked by green buoys, with the word wreck and a number over it painted on them in white letters; when a wreck lies in the open sea, or in a position where there is a navigable channel on either side of it, the buoy carries no other distinguishing mark, and is in every such case placed seaward of the wreck.

Wreck buoys marked with an even number must be left on the starboard hand by vessels entering.

Wreck buoys marked with an odd number must be left on the port hand by vessels entering.

All other marks on buoys are in addition to the foregoing.

Wreck-marking vessels carry by day a red flag or such other mark as may be locally notified, and at night exhibit either one red light or a red light vertically over a white light.

Beacons.—Beacons painted red mark the starboard side of the channel, and must be left on the starboard hand by vessels entering.

Beacons painted black mark the port side of the channel, and must be left on the port hand by vessels entering.

Beacons painted in black and red vertical stripes mark spits, and the outer and inner extremities of banks, shoals, or extensive reefs, where there is a navigable channel on either side of such spit, bank, shoal, or reef.

Beacons painted red and black checkered mark rocks in the open sea, also rocks of small extent having channels on either side of them.

When two checkered beacons—red and white and black and white—mark a rock or reef, the red and white beacon marks the starboard side of the channel, and must be left on the starboard hand by vessels entering; and the black and white beacon marks the port side of the channel, and must be left on the port hand by vessels entering.

The above rules for painting beacons apply in each case to the body of the structure. When a beacon painted a single color, either black or red, is surmounted by a distinguishing mark, such mark may be painted the same color as the body of the beacon or with that color and white combined or white alone.

When the body of a beacon is painted in two colors, the same colors only are used for the mark surmounting it.

Beacons on land, to enable bearings to be taken, or to give lines of direction for crossing bars or entering rivers, harbors, etc., are painted so as to make them as conspicuous as possible. Red, black, and white are the only colors used.

Light-vessels.—The light-vessels in Chinese waters exhibit a white light from the forestay, to indicate the direction in which the vessel is riding.

Light buoys must not be implicitly trusted.

Chinese vessels—Lights.—The regulations for preventing collisions at sea are accepted for general use in Chinese waters by all Chinese vessels of foreign type, but Chinese junks, fishing vessels, etc., do not carry the regulation lights.

Steam pilot vessels in Chinese waters, when engaged on pilotage duty; carry, in addition to the lights required for pilot vessels by the regulations for preventing collisions at sea, a red light, visible all round the horizon from a distance of at least 2 miles, at 8 feet below the white mast-head light, and when under way also the usual side lights.

Junks—Caution.—Enormous fleets of fishing junks may be met on the coast of China. These vessels carry no lights. As a rule they have the smallest sail forward and are stoutly built. Serious damage would probably be caused to an iron vessel in collision with one of them. The large trading junks have five masts, with two small sails aft.

Water—Caution.—On the coast of China no water for drinking or cooking purposes should be procured from the shore if it can possibly be avoided. If water can not be obtained by condensation, great care must be taken in selecting the watering place on shore, which it is essential should be above cultivated areas. The water should be boiled before use.

Dysentery and probably cholera, which is particularly prevalent at the end of summer and in autumn, result from drinking impure water. The peculiar way the Chinese manure the fields, the overcrowding in their towns, and a general disregard of ordinary sanitary precautions cause the pollution of the water.

Aerated waters sold by the natives and ice stored by them must not be used.

Diseases.—In China, besides dysentery and cholera, milder forms of intestinal diseases are common in summer, and occur probably from the promiscuous use of raw vegetables, or from chills caught when lying on deck at night.

There is a peculiar form of intestinal catarrh, popularly known as sprue, which attacks Europeans predisposed to illness; the mucous membrane is affected, diarrhea is often profuse, and only fresh-milk diet, and often hospital treatment, or removal from the country, can cure the patient.

Coaling stations.—A stock of 500 tons and over of coal is maintained for the use of steamships at Hongkong, Swatau, Amoy, Ningpo, Shanghai, Hankau, Chifu, Tientsin, and at Ke lung in Formosa.

Smaller quantities than the above are kept at Fuchau, Chinkiang fu, Taku, Newchwang, and Tamsui in Formosa.

Docks and repairs.—There are dry docks at Hongkong, Amoy, Pagoda anchorage, Fuchau; Shanghai, Taku, Port Arthur, and Port Dalny.

Large repairs to hull and machinery can be executed at Hongkong, Shanghai, and Taku; small repairs can be effected at Amoy, Pagoda anchorage, and Hankow.

Naval dockyards and establishments.—There is a British naval dockyard at Hongkong, and a naval establishment at Wei hai wei; there are Chinese government dockyards at Whampoa, Pagoda island on the river Min, Shanghai, and Taku. There is also a German naval station at Kyau chau.

Communications.—In addition to the regular mail lines of the Peninsula and Oriental Steam Navigation Company and the Messageries Maritimes de France, which convey European mails weekly to Hongkong, the Pacific Mail Steam Navigation Company have a fortnightly service from Hongkong, via Yokohama, to San Francisco, and the Eastern and Australian Mail Steamship Company and the China Navigation Company have a frequent service from Hongkong to Australia. The Norddeutscher-Lloyd steamers go to and from Europe fortnightly, the Austrian Lloyd steamers monthly, and the Canadian Pacific Railway Company's steamers run a three-weekly service to Europe from Hongkong, via Vancouver and the Canadian Pacific Railway; also the Portland line of steamers have a monthly service to Portland, Oreg., touching at Japanese ports and Victoria, British Columbia.

There is daily communication between Hongkong, Macao, and Canton; and also frequently between Hongkong, Swatau, Amoy, Fuchau, Shanghai, and other ports. There is communication between Hongkong and Japan three or four times a week, and occasionally between Shanghai and Tientsin, calling at Kyau chau and Chifu. The Osaka Shosen Kaisha run a line of steamers between Hongkong, Swatau, Amoy, and ports in Formosa, and also between Takau, Ke lung, and Japan. A steamer leaves Ke lung every 14 days, going round the island of Formosa by the east coast, and one every 14 days going by the west coast; each voyage lasts 8 days, and the ports of call include Suao, Takau, Anpei, Makung, besides some small ports.

Railways.—At the end of the year 1905 there were open for traffic about 3,700 miles of Chinese railway.

The lines completed and in process of construction are a line from Lu kau chiao (near Peking) to Hankau, which is open southward to Cheng ting fu; it will be continued through Shunti, across the Hwang ho in the vicinity of Kai fung fu, and through Yuning to Sinyang, whence it is nearly completed to Hankow; it is expected that the whole of this line will open for traffic in 1903; a line from Peking to Tientsin is open and in working order; a line from Tientsin to Shanhaikuan, via Tungku and Kaiping, continuing thence to Newchwang port, via Chung hu so, Ning yuen chu, Kin cho fu, crossing the Taling river, Shih san shan, and eastward skirting the coast to Newchwang port, is completed and working. A line is constructing between Canton and Hankow.

The Chinese Eastern Railway runs, with a branch from Port Arthur, through Ta shih chiao, where there is a branch to Newchwang port, and extends northward to Harbin, where it connects with the Russian Siberian line to Vladivostok. This line constitutes a railway linking western Europe and the Far East.

Another extension is being prosecuted from Kin cho fu to Hsin min tun.

The line between Shanghai and Wusung is open and working.

A railway is being constructed from Tsingtau, via Wei hsien, to Tsi nan fu, together with a branch line to Poshan; it is open to Tsin chu fu.

In Formosa there are lines from Ke lung to Taipei, between Taipei and Twa tu tia, and between Taipei and Miaoli; the latter line is to be extended to Takau, and the portion from Takau northward to Kagi, a distance of about 67 miles, is open for traffic.

Telegraph.—Telegraphs are being extended all over the Chinese Empire; there are about 22,170 miles now working, with 360 offices. The capital, Peking, and the principal places in the Empire, are connected with the universal system.

The principal ports in Formosa and Makung in the Pescadores are also connected, submarine cables being laid from the river Min to Tamsui, from Kelung to Japan, and from Anpei to Makung.

Postal service.—By edict of November 6, 1906, the control of the postal service was transferred from the maritime customs to the board of communications. There are 38 head offices, 484 branch offices, and 1,574 agencies. In addition to the usual postal packages carried, letters, newspapers, etc., a money-order system was also established. China has postal conventions with India, France, Japan, Germany, and Hongkong, and through their intermediary has postal communication with postal-union countries.

Money.—The circulating medium in China, in transaction with foreigners at the open ports is chiefly whole or broken dollars, clean or chopped; and the value of the dollar in relation to the tael is variable, the latter being approximately one-third more.

Chopped dollars are those which are stamped all over and defaced with innumerable private commercial (or hong) marks. Clean dollars have no mark or stamp whatever.

All imports and exports, as also all dues and duties, are calculated by the maritime customs, controlling the treaty ports, in haikwan taels, an artificial and fictitious method of reckoning, and intended solely to enable the Chinese Government to levy the tariff dues in pure silver. This tael is not a coin at all, but is merely a quantity of silver unalloyed, weighing 1⅓ ounces avoirdupois. Its sterling exchange fluctuates; in 1890 the haikwan tael stood at 5s., but in 1902 the value of silver had so depreciated that the same tael only realized some 2s. 6d.

A British dollar, identical in weight and fineness with the Japanese yen is issued for circulation in the East, and is made legal tender in Hongkong, the Straits Settlements, and Labuan. Its value in 1902 was 2s. 0½d.

Weights.—The values of the weights, as fixed by treaty, and those in common use in China, are:

	British treaty.	French treaty.	Common weights.
Tael	1.333 ounces avoirdupois	37.783 grams	1.328 ounces avoirdupois.
Catty	1.333 pounds avoirdupois	604.53 grams	1.326 pounds avoirdupois.
Picul	133.33 pounds avoirdupois	60.453 kilograms	132.6 pounds avoirdupois.
Stone	159.99 pounds avoirdupois	72.544 kilograms	159.1 pounds avoirdupois.

The picul and catty are chiefly used in dealing with foreigners. The following equivalents may be useful:

1 ton = 16 piculs, 80 catties.
1 hundredweight = 84 catties.
1 pound avoirdupois = 0.75 catty, or 12 taels.
4 ounces = 3 taels.
1 picul = 1.19047 hundredweight, or 133.333 pounds.
3,000 taels = 302 pounds troy.
10 mace = 1 ounce = 1.333 ounces avoirdupois.
16 ounces = 1 catty = 1.333 pounds avoirdupois.
100 catties = 1 picul = 133.333 pounds.

Chinese weights and grain measures all vary in different parts of the country, but generally they are largest and longest in the southern provinces.

Measures.—The li is generally estimated to be about one-third of a mile of 6,080 feet.

1 gran = 1 fun = 0.14 inch.
10 fun = 1 tsun or inch = 1.41 inches.
10 tsun = 1 chi or foot = 14.1 inches.
10 chi = 1 chang or pole = 11.75 feet.
10 chang = 1 yin = 117.5 feet.

In the tariff settled by treaty between Great Britain and China, the chi of 14.1 inches is adopted as the legal standard. The standards of length vary all over the Empire, the chi ranging from 9 to 16 inches, and the chang in proportion. In the treaty ports the treaty standard of chi is coming into use.

Standard time.—The mean time of the one hundred and twentieth meridian of east longitude has been adopted at Hongkong, Amoy, Wei hai wei, Chifu, Newchwang, also at all Yangtze ports as far as, and including, Ichang, and at Chang sha on the Siang river.

Places on the Yangtze above Ichang, and Chang teh fu on the Yuen river, keep the mean time of the one hundred and fifth meridian, or seven hours fast on Greenwich.

Treaty ports.—Foreign governments under treaties with the Chinese Government have the right of access to certain ports of the Empire. These are known as the "treaty ports." Consular officers reside at each of these ports in China in an area named the "foreign concession," an area entirely distinct from the native city in its boundaries, government, and commerce. Regulations for the government of the concession, which everyone is required to obey, are to be seen at the public office of every consulate.

The ports contained in the area described in this volume are as follows:

Northern ports.—Chifu or Yentai; Tientsin with Taku; Ching wang tao, and Newchwang port, or Yingtze.

Yangtze ports.—Shanghai, Suchau, Chinkiang fu, Nanking, Wuhu, Kiukiang, Hankow, Yo chau fu, Shasze, Ichang, and Chungking fu.

Eastern ports.—Canton with Whampoa, Swatau, Amoy, Fuchau fu with Pagoda island, Funing fu, Wenchau fu, Ningpo fu, and Hangchau fu.

In the Si kiang.—Samshui with Kongkun, and Wuchau fu, with freedom of navigation between them, Hongkong, and Canton, by a route from each of these latter places to be selected and notified by the imperial maritime customs. The following places are established as ports of call for goods and passengers: Kong mun, Kum chuk, Shao king, and Tak hing. And for passengers only: Yungki, Mahning, Kau kong, Howlick, Luk pu, Yuetshing, Luk tau, and Do sing.

ROUTES FOR FULL-POWERED STEAMERS.

Hongkong to Manila.—Direct in both monsoons. The distance is 627 miles.

Manila to Hongkong.—In the northeast monsoon keep along the coast of Luzon at about 3 miles distant as far as Piedra point, thence direct. During this monsoon there is a northerly current between Manila bay and Piedra point, and between Piedra point and Pratas shoal a westerly current of 24 to 36 miles a day.

In the southwest monsoon, direct, allowing for a northeasterly current of 18 to 48 miles a day.

Hongkong to northern Chinese ports.—Direct, keeping 5 to 10 miles eastward of the outer islands. In steaming against a strong northeast monsoon take every advantage of obtaining shelter, keeping as close to the coast as safety permits until beyond the Chusan archipelago. In daylight and clear weather pass inside Lamock islands and the Brothers; at night it is advisable to go outside them. Guard against an indraft while passing South Merope shoal during the flood. The channel inside Turnabout island should not be used. In the northeast monsoon the southwesterly current is very strong between Turnabout and Tung yung islands, and has been known to run 4 to 5 miles an hour. There is an indraft into all the deep bights on the coast during the flood.

It is safe to pass inside Alligator island in clear daylight, but not at night, as the island is only 40 feet high. From Tung yung northward to Tongting do not go inside any of the islands, as there may be dangers not shown on the charts. The Tai chau islands are good landmarks; when passing them do not shoal to less than 15 fathoms. Pass 5 miles eastward of Shaho (Pei yu shan) lighthouse, and steer a course to a position 4 miles eastward of Tongting, then to Steep island pass.

When approaching Steep island and thence through the islands it is necessary to consider and allow for the set of the tidal streams; the arrows on the chart indicate their normal rate and direction.

In thick weather, with the land obscured, it is advisable to anchor before having run the distance to Steep island; good anchorage can be obtained in 15 to 20 fathoms, mud; as the streams are very strong, the ship must be brought head-to before anchoring.

If keeping seaward outside the islands in thick weather, it is necessary to pass eastward of the Barren islets, giving them a very wide berth, and then it is difficult to obtain the ship's position again.

Video island is an excellent mark; it is the best to make from the southward, as it is steep on its southern side.

The following route is taken by coasting steam vessels of 22 feet draft, by which much of the heavy sea is avoided, and sometimes they make a quicker passage than the mail steamers that keep well offshore. This route leads over much very imperfectly surveyed ground, and local knowledge is desirable.

Round Lamtong island, pass half a mile southward of Steepcliff head, and steer for Mirs point; skirt the coast to Teyi point, and go outside Middle rocks, pass half a mile off Fokai point; and thence steer toward Chilang point, leaving Reef islands 1 mile to the northward. Pass 3 miles southward of Siki, and follow the trend of the coast at about 4 miles distant to Breaker point, and thence steer successively to positions 4 miles southward of Tide point and 1¾ miles eastward of Good Hope cape.

Thence steer for Brig island, passing eastward of Dove rock, through Namoa strait, southward of Dioyu reef to Owick point, and outside Bell island, inside Cliff and Square islands, 1 mile off Cone point, to Thunder head.

An alternative route is from Breaker point to Three Chimney bluff, the east extreme of Namoa, passing 1 mile westward of Plat island and avoiding Tamsui and Kaipan rocks, thence to outside Bell island and to Thunder head as above.

From Thunder head pass outside Rees rock, through Rees pass and northward of Gu, Flying Fish, and Ching rocks, 1,000 yards southeastward of Hut islet (Tagau point), and outside Baker rock, Spire island, Black rocks, Cork point, and House hill point; pass southeastward of Notch island and Chapman patch, and thence off Chin ha point. Cross the entrance to Amoy harbor, pass southeastward of Dodd island, give a berth to the 14 feet patch 1¼ miles eastward of the island, and steer for Scrag point.

From Scrag point follow the coast at not less than 1 mile distant, crossing Chimmo bay entrance, to Chung chi point, thence pass half a mile off Pyramid point and 2½ miles off Rogues point. From here stand inside Sorrel rock and well in to Ping hai bay; pass Ping rock, through Lam yit channel, northward of the Passage islands, round Vangan point, through Hai tan strait and inside the Tessara islands; steer, allowing for an inset, to pass about 1 mile outside Outer Min reef, and then straight for Spider island, leaving it to the westward; through Seaon channel, eastward of Fu yan and westward of Incog islands; leave Ping fong island and the rocks off it to the westward.

From eastward of Ping fong steer a direct course for Tung pwan island, avoiding Farmer rock, which is only visible at low water. Pass about half a mile eastward of Tung pwan, and go either, according to the draft of water and the state of the tide, through Bullock harbor and inside Flask island and Mosquito rock, or through San pwan pass; thence between Ta luk and Seo luk islands, eastward of San shi and the Stragglers, and westward of Soudan island, leaving Chik hok 1 mile to the westward; steer direct to 1½ miles eastward of Tung chu and Montague islands, westward of Kue shan islands and northward through Nu pi shan channel. The track continues through Gough pass, round Ketau point, through Tower Hill and Blackwall channels, and westward of Dunsterville and West Volcano islands, then southeastward of Rugged islands, and between them and Bassett and Morrison islands; pass 4 miles eastward of Gutzlaff, and continue a 10° course for 6 miles, whence steer direct to the fairway bell light buoy at the entrance to the Yangtze. From the buoy thence to Shanghai.

If drawing over 20 feet water, or at night, pass outside Kue shan, eastward of Piting, through Steep island pass and Bonham strait.

Caution.—Care is necessary when navigating on this coast, as the tidal streams are very strong in the Chusan archipelago and its approach.

At all times during the northeast monsoon the weather is uncertain, and strong breezes set in without any warning, sometimes lasting 2 or 3 days, or even more. Fogs are similarly experienced in the early part of the year.

Vessels of small steam power should not attempt to proceed northward during the northeast monsoon, nor during the typhoon season, except by the inshore passage.

Good shelter during the northeast monsoon may be obtained at convenient distances along the coast.

Hongkong to Yokohama.—Direct as possible, but during the northeast monsoon keep as close as prudent to the coast of China northward to about Tung yung island.

Hongkong to Nagasaki.—Direct, but during the northeast monsoon keep as close as prudent to the coast of China northward to about Tung yung island.

Yangtze to Nagasaki and back.—Nearly direct, passing between Me sima and Tori sima.

Yangtze to Yokohama.—Direct round the south end of Japan, and thence in the Japan stream.

Another route, but 110 miles longer, is through the Inland sea.

ROUTES FOR SAILING AND AUXILIARY STEAM VESSELS.

Hongkong to northern Chinese ports—In the northeast monsoon.—A vessel should be in good condition for meeting with rough weather and for carrying sail to make this passage during the northeast monsoon.

Work along the coast as far as Breaker point, to maintain as long as practicable the advantage of the land wind at night, of smoother water, and the ebb tidal stream out of the deep bays, which will generally be under the lee on the starboard tack. There are numerous convenient anchorages should the wind blow too hard to make way. Keep within 10 miles of the land, to avoid being carried southward by the monsoon drift current while standing offshore; but as this can not be done at night without risk, anchor, if possible, in the evening, and weigh in the middle watch, when the wind, generally being more off the land, allows a good board on the offshore tack to be made. From Breaker point stand across to the southern end of Formosa, as by passing eastward of that island the heavy short sea of Formosa strait is avoided, as well as the constant southerly current.

After rounding the southern end of Formosa, off which there is generally a troublesome sea, make short tacks, if requisite, and keep within the influence of the Japan stream.

The northeast monsoon does not blow with its full strength on the east coast of Formosa, but strong gales are often experienced at 20 miles to the eastward; if the wind declines in strength, with less sea on the western board, particularly between 9 a. m. and 3 p. m., or up to sunset, it is advantageous to hug the coast as far as prudent; but caution is requisite, for the coast is mountainous and steep-to, and sudden loss of wind accompanied by swell might be attended, if followed by calm, with imminent danger, as there are no harbors. Stronger winds, with much rain, are met as advance is made eastward during the northeast monsoon.

If an offshore course is maintained while eastward of Formosa a constant succession of bad weather may be expected, with strong winds and a heavy sea.

Toward the close of the northeast monsoon, and still later, it is preferable to cross over toward Luzon than to beat up to Breaker point against fresh northeast breezes. From Hongkong, bound through one of the channels between Formosa and Luzon, from March to June, inclusive, but more particularly in March and April, during brisk northeast winds and a strong westerly current, a week is frequently taken in beating along shore to Breaker point before standing off; whereas after clearing the Lema channel, by standing off on the port tack, clean full to the southeastward, the westerly current is soon passed through, and on nearing Luzon the wind becomes more easterly (sometimes even from southeast); then tacking north-northeastward with a strong favorable current, a vessel probably reaches eastward of Formosa in less time than she would have taken to fetch Breaker point by keeping along the coast of China.

Having weathered the northern end of Formosa, it is still advisable to keep well eastward, and not approach the continent until the parallel of Lat. 30° 30′ N. is gained. In case of being driven westward, take advantage of the tidal streams through the southern part of the Chusan archipelago.

For Swatau, Amoy, or the ports between that place and the Min river, there is generally difficulty in getting round Breaker point, for the tidal stream there is of no assistance. Advantage must therefore be taken of the wind which will probably draw off the land after midnight, when, by being inshore, a good board can be made, and possibly Good Hope cape reached. Haimun bay and Hope bay anchorages.

Having reached Good Hope cape, the flood stream assists a vessel to round it, and the ebb out of Han river is a weather tide; with this stream, if not going inside Namoa island, endeavor to get along the southern side of the island, where there is an eddy stream, and clearing Kaipan and Tamsui rocks, anchor in South bay, should the weather be too bad to proceed on the flood. Both streams are strong off Three Chimney point, and also off Jokako point, in rounding which take the first of the flood and the port tack.

Farther northward, about Rees island, the flood or northeast-going stream with strong winds causes a very uneasy sea. Red bay and Tingtai bay are good stopping places for small vessels; the latter should be preferred, though at the loss of 2 or 3 miles, to anchoring in an exposed position in Amoy harbor entrance, as when northeast winds freshen there on the flood they are generally accompanied by a mist, which obscures the entrance, and the tidal stream makes it difficult to get to sea.

Liau lu and Hu i tau bays are northward of Amoy, and both afford good shelter; Chimmo bay is not so good. The current in the monsoon overcomes the tidal streams, and advantage must be taken of every slant of wind, bearing in mind that it is likely to draw off the land after midnight, and in the event of anchoring for shelter this is the time to start, should the wind moderate. By waiting for daylight vessels lose their offing, and have to make an offshore board at a loss. The fogs are at times thick, and the lead must be used, the bottom generally changing from sand to mud as the shore is approached. There is fair anchorage under Pyramid point, but not so good as that under South Yit; and if the vessel is heading north, or anything east of it, the ebb from Meichen sound is of assistance.

The most difficult part of the passage is from Lam Yit island, or the southern end of Hai tan strait to White Dog islands. Sailing vessels should keep outside Hai tan strait, and stretch over to the northwestern coast of Formosa, where they have the advantage of a weather tide.

On the coast of China northward of the Min river the indrift of the flood must be considered. As a general rule, tack for the inshore tide when the moon is on the meridian.

Bertha cove, in Tung yung island, is a snug anchorage, and northward of this vessels (unless under 12 feet draft) must keep off the coast in deep water. The tidal streams afford but little assistance until the Chusan archipelago is reached. Nam ki and Pi ki shan islands afford good shelter.

The route through the southern channels of Chusan archipelago is not usually taken by sailing ships.

In working through the northern part of the archipelago advantage can be taken of the tidal streams.

The eddy tidal streams generally carry vessels clear of the large islands, but caution is required to prevent being set in amongst detached rocks.

In the southwest monsoon.—There is no difficulty in making this passage, but northward of the river Min it is often as late as May or June before the southwest monsoon sets in, and the northeasterly winds prevail for 9 months of the year; therefore, before June and after August, the passage is likely to be tedious. Inshore the winds are generally light and the sea smooth, but at a distance from the land strong northeasterly winds with considerable sea are frequent, the high swell appearing to indicate a prevalence of those winds. In the offing, also, the current usually sets southwestward, and during a calm at 20 miles outside the Tae islands its rate has been observed to be 2 to 3 miles. This current was a surface current 16 feet in depth.

Shanghai to Hongkong—In the northeast monsoon.—After passing the Saddle group and Video steer a good offshore course, passing outside the outer islands, giving them a good berth by night, and closing the land to obtain the position in the day if no astronomical observations are obtained, for thick, hazy, or rainy weather may always be expected.

In the southwest monsoon.—Although the constant adverse current makes this a tedious passage, a vessel of moderate sailing qualities can do it, as the southwest monsoon is not steady in its direction, and land and sea breezes prevail. Fogs are frequent in the early part of the season, and render caution in navigation at times necessary; they sometimes lift near the land.

South Indian ocean to China.—After passing St. Paul island, from October to April, cross Lat. 30° S. in about Long. 95° E. and thence stand direct to Sunda strait, taking care to pass well to the westward of Java head as westerly winds blow strongly along the southern coast of Java. If contrary winds are experienced after passing St. Paul island, stand northward through the southeast trade into the northwest monsoon and thence direct to Sunda strait.

At the change of monsoons (middle of March to middle of April, and middle of September to middle of October) when the winds are variable, make sufficient easting in the southeast trade to bring Java head north, and then steer direct for it.

Vessels which get through Sunda and Carimata straits before the commencement of the northeast monsoon, usually about the first week of November in the southern part of the China sea, can adopt the Palawan passage with advantage, but if adverse winds are met in Carimata strait the Second Eastern passage should be at once taken. Vessels leaving Sunda strait in October and November may take the First Eastern passage, thus: Through Java sea, Makassar strait, Celebes sea, Basilan strait, Sulu sea, passing along the western coasts of Mindanao, Negros, and Panay islands, and into the China sea by Mindoro strait or Verde island passage; thence work along the coast of Luzon as far as Piedra point or even to cape Bojeador, when stand across the China sea, passing to leeward of Pratas reef, and enter Hongkong by Lema channel. If bound for northern Chinese ports the Pacific is entered southward of Mindanao, and a route taken eastward of Formosa. The First Eastern passage is not recommended as Makassar strait is not properly surveyed, and there are numerous shoals in it.

Vessels leaving Sunda strait from the middle of November until February take the Second Eastern passage thus: Through Java sea, Salayar strait, Buton passage, Pitt passage, and into the Pacific ocean by Gillolo passage, or Dampier strait; thence make easting between Lat. 1° 30′ N. and Lat. 3° N. till able to pass eastward of the Pelew islands, when stand northward and enter the China sea between Luzon and Formosa, and thence steer direct for Hongkong, allowing for the current. After February pass westward of the Pelew islands.

To northern China pass eastward of Formosa. If taking the First Eastern passage the Java sea may be entered by Bali, Lombok, or

Allas strait, instead of by Sunda strait, and thence through Makassar strait, etc.

If taking the Second Eastern passage, the Flores sea may be entered by the Ombai pass; in this case after passing St. Paul island enter the southeast trade in about Long. 110° E., and after passing Northwest cape of Australia, steer direct for and through the Ombai pass, across the Flores sea and through Manipa strait into Pitt passage, etc.

After passing St. Paul island from April to September steer for about Lat. 30° S., Long. 100° E., thence to Lat. 20° S., Long. 105° E., and close westward of Christmas island to Java head, keeping well to the eastward, especially in June, July, and August, when the southeast monsoon is at its strongest, to prevent falling to leeward of Java head, where the wind sometimes backs to east or east-northeast, and the current sets strongly westward, when considerable difficulty would be experienced in making Sunda strait.

From Sunda strait proceed northward through Banka strait, and between Anamba and Natuna islands into the China sea; thence direct between the Paracels reefs and Macclesfield bank.

Gaspar strait is more direct than Banka strait, and is frequently taken, but in thick weather Banka strait can be navigated without risk while Gaspar strait can not then be approached with safety.

The northeast monsoon of the China sea blows from October to March, when the northwest or westerly monsoon prevails eastward of Sunda strait; the southwest monsoon of the China sea corresponds with the southeast monsoon eastward of Sunda strait.

Another route, the Great Eastern, has been taken with great success by vessels passing the cape of Good Hope in September. It leads southward and eastward of Australia, westward of New Caledonia, between the Solomon islands and New Britain, across the equator in about Long. 156° E., and thence direct. The season of cyclonic storms in the western part of the South Pacific ocean is from December to March.

Auxiliary steam vessels take the track of sailing vessels, but from October to February, instead of taking either of the Eastern passages, steam through Banka or Gaspar strait, cross to the coast of Borneo, and thence by the Palawan passage to Hongkong.

China to the South Indian ocean.—In the northeast monsoon pass between Macclesfield bank and the Paracel reefs, then about 60 miles eastward of pulo Sapatu, between Anamba and Natuna islands, and through Banka or Gaspar strait to Sunda strait.

In the southwest monsoon, leaving the coast of China in March, April, or the early part of May, stand over to the coast of Luzon and proceed through Palawan passage, along the coast of Borneo, through

Api passage, past Direction island, and through Carimata strait, then close round the North Watcher, and direct to Sunda strait. On this route easterly winds, without calms, but with fine weather, and a smooth sea are likely to be experienced.

Leaving at the end of April or beginning of May, another route is to stand toward the Macclesfield bank, and then follow the First Eastern passage, thus: From near the Macclesfield stand southeastward, pass through Mindoro strait, along the coast of Panay, through Basilan strait, the Celebes sea, and Makassar strait to Sunda strait, or through Molucca and Pitt passages, if entering the Indian ocean by Allas, Lombok, or Bali straits. The route through Makassar strait is not recommended, as it is very imperfectly surveyed.

From the middle of May to the end of July cross the China sea, pass through the Balintang channel, and stand southeastward in the Pacific, round the Pelew islands, but not too far to the eastward, thence make southing and go through either Gillolo passage or Dampier strait into Pitt passage, thence through Manipa strait and into the Indian ocean by Ombai pass.

In August stand toward Hainan island, cross the gulf of Tong king, and work down the coast of China with the land and sea breezes as far as cape Varella or cape Padaran. Then cross to the coast of Borneo, tacking as necessary to clear any reefs, and work along that coast and through Carimata or Gaspar strait to Sunda strait.

CHAPTER II.

YALU RIVER TO TIENTSIN.

Yalu river (Amunyoku Kan).—The Yalu river, the longest river in Korea, flows into the northern part of the Yellow sea in Lat. 39° 48′ N., Long. 124° 14′ E., where it forms the boundary between China and Korea. The land on both sides of the entrance is low, but the islands in the entrance are from about 50 feet to 280 feet in height. The delta of the Yalu is partly submerged during the melting of the snow, and the mouth of the river is usually closed by ice from the end of November to the middle of March.

The Yalu is navigable by small junks as far as Mao Erh Shan about 200 miles above its mouth. Vessels of 12-foot draft, with careful navigation, can reach Antung, where there is a tidal rise of 8¾ feet at springs.

Islands.—Shinto group, consisting of one large island and several small islets and rocks, lies on the western side of the river entrance, near the middle of an extensive bank which dries at low water. Chandz tau, the largest island of the group, is about 1¾ miles in extent and 281 feet in height.

On the southeastern side of the approach to the river are the Banjo islands, the largest of which, Tsunguru Somu, rises to a height of 252 feet.

Tasarugi island, 144 feet high, lies about 6½ miles northward of the Banjo islands. Anchorage may be had in from 3 to 7 fathoms, about ½ mile westyard of Tasarugi.

Many other islets and rocks exist in the entrance to the Yalu, as shown in the chart.

Light buoy.—A red gas buoy, No. 2, showing an intermittent red light every 8 seconds, thus, light, 5 seconds; eclipse, 3 seconds, is moored in the southeastern approach to the Yalu, 10¾ miles 188° 35′ from Shurerii islet, the westernmost of the Banjo group.

Channels.—There are two principal channels by which vessels may enter the Yalu river, but great caution is necessary on account of the numerous shoals and sand banks. The western channel extends in a northerly direction westward of the Shin to group, and has general depths of 1¾ to 4 fathoms, but about 5½ miles northward of Chandz tau the channel is obstructed by a bar with a depth of only

¼ fathom at low water. About 1 mile beyond the bar the channel turns sharply to the eastward, with a least depth of 1¼ fathoms, to Yongampo (Nombau), off which there is much more water.

Buoys and beacons.—The western channel is marked by 7 red buoys with even numbers and 5 red beacons with triangular top marks on the starboard hand entering, and by 3 black buoys with odd numbers and 1 black beacon with a triangular top mark on the port hand.

The outer red buoy, No. 2, has a conical top mark and is moored 10¾ miles 241° from Ma to, the western island of the Shin to group.

Eastern channel.—The eastern channel passing westward of Banjo islands and eastward of Kurumi to has a least depth of 2¾ fathoms as far as Tasarugi anchorage, above which are shoal banks with depths of less than 1 fathom at low water. The two channels unite about 10¾ miles above Tasarugi and thence to Antung, about 16 miles farther up; the least depth is about 4½ feet at low water.

Buoys.—In addition to the light buoy the eastern channel to Tasarugi anchorage is marked by 5 buoys—1 red buoy; No. 4, on the starboard hand entering, and 4 black buoys with odd numbers on the port hand; all the buoys except the light buoy are surmounted by top marks.

Tides.—High water full and change at the Banjo islands is 9h. 10m. Springs rise 23 feet, neaps 16¾ feet.

At Tasarugi anchorage at 9h. 23m. Springs rise 23 feet, neaps 16¼ feet.

At Yongampo at 10h. 41m. Springs rise 18 feet; neaps 12¾ feet.

At Antung at 11h. 55m. Springs rise 8¾ feet; neaps 5¾ feet.

The streams run at the rate of about 3 to 4 knots in Taatonko road, but during the rainy season the ebb in the river itself, increased by the freshets, may attain a rate of 6 knots.

Settlements.—Taatonko, on the western side of the river entrance, is one of the chief Chinese customs towns, and has a population of 10,000. It is a dependency of Antung.

Two steamers call here weekly from Chifu (alternately about every 4 days).

Taatonko road, nearly 6 miles southward of the town, affords anchorage for vessels of about 12-foot draft; the mail steamers do not go above this anchorage. It is icebound during the winter months. Landing at the town is difficult, as the creek is shallow.

Vessels proceeding up the river should leave Taatonko road at half flood.

Yongampo (Nombau).—On the Korean side of the river, about 10 miles above Taatonko, is a treaty port. Here the river is about 1½ miles wide, and the Chinese shore is low and well cultivated. There is a depth of 10 fathoms about 1 mile westward of the town.

Santanlantau, with a population of 5,000 and a custom-house, is situated on the Chinese shore, about 7 miles above Yongampo. Odoku, also on the Chinese shore, is about 2 miles farther up, and has about 2,000 population.

Antung, with a population of about 15,000, is about 4½ miles up the river from Odoku and is the most important town on the Chinese side. The Governor of Antung province resides here.

The tidal rise at Antung is about 8¾ feet at springs and there is about 2 fathoms of water in the fair way.

Trade.—The imports consists of oil, nankeens, iron, provisions, etc., from Shantung promontory; the chief exports is timber, mostly pine, walnut, and oak, immense rafts of which are floated down the river from above Antung. There is a custom-house here.

Telegraph.—Antung is connected with the Chinese system of telegraphs.

Ta ku shan and Ta yang ho.—About 22 miles westward of Ta tung kau is the entrance of the Ta yang ho, on which river at some 8 miles within the entrance is Ta ku shan town. It is the second port in Manchuria, and possesses many large native warehouses, a great amount of produce from the north being exported through it.

Navigability.—Boats have ascended this river without difficulty as far as Ta ku shan town. A depth of 1½ feet was found on the bar at low water, but it may dry at low-water spring tides. Inside the bar the least water found was 7 feet, with a general depth of 8 feet. At the anchorage off the town there is a depth of 8 feet at low water, bottom soft mud, on which vessels drawing less than 10 feet ground; the tidal rise at springs is some 20 feet. The banks of the river from the entrance to Ta ku shan are low and in some places submerged at high water; the river is 330 yards wide at the town.

About 4 miles off the entrance to the river are the two small islands, Ta lu tao, which is 650 feet high, on the southern side, and Siau lu tao on the eastern side; the channel into the river lies between these islands; the channel westward of Ta lu tao is not practicable even for boats. Shoal water with less than 3 fathoms extends some 2 miles southward of Ta lu tao and about 8 to 9 miles off the coast both eastward and westward of it. There is anchorage in 5½ fathoms at about 3 miles southward of the peak of Ta lu tao.

Within the entrance the Ta yang ho trends northwestward and then northeastward to Ta ku shan (Great Orphan mount) town, which has a population of 30,000 to 40,000, and is situated on the right bank of the river, at the foot of a steep hill, about 730 feet high, with a wooded ravine on its seaward side. Above the town the river trends eastward; it has many tributaries, and is said to rise in Lat. 41° N., Long. 123° 30′ E.

From two to three hundred junks arrive annually from the northern Chinese ports. The larger junks seldom cross the bar, but anchor under Ta lu tao island, and discharge from lighters; the smaller junks ascend the river to Ta ku shan. The exports are chiefly bean cake and timber; also small quantities of an inferior quality of silk.

A road runs southwestward from Ta ku shan to Pi tsu wo, and northward to Fung hwang chung, where it joins the great road running from Seoul to Peking.

Ice.—The river is frozen over from the end of November until the beginning of March.

The coast from Ta yang ho entrance trends west-southwestward for 75 miles to Yen toa bay; it appears to be hilly, and five rivers flow through it to the sea.

A wreck lies in 2½ fathoms on the edge of the shoal extending from Ta lu tao, with the summit of that island bearing 22°, distant 4¾ miles. The 5-fathom line is about 1 mile southward of the wreck.

The wreck of a man-of-war with fighting tops above water at half tide, lies in 9 fathoms, with Ta lu tao summit bearing 34°, distant $13\frac{8}{10}$ miles.

Bourchier group consists of several islands lying off Styena point, a projecting point of the coast, which rises to Dvuglavaya hill, 700 feet high. Changi tao, the southern island, is barren, with sharp-pointed rocks off its southern point, over which rises a hill, having two sharp peaks of unequal height. This group has not been examined.

Pitsuwo is a harbor in Lat. 39° 24′ N., Long. 122° 22′ E., situated on the sea, at the entrance of a river, and it is fairly well protected from all winds by a series of rocks, which form a semicircle. It has a coasting trade, but the water is shallow, and many of the junks are left high and dry at low water. The harbor is open all the year round. The warehouses here are large, and the import and export trade considerable. Much salt is obtained by evaporation.

From Pitsuwo town the great road to Newchwang strikes across the peninsula to the head of port Adams, which is 18 miles distant.

There are two islands, Maitao and Pin tao, off Pitsuwo bay. Maitao rises to a cone-shaped hill, 100 feet high.

Wuma tao, or Yang tao, about 10 miles south-southwestward of Changi tao, rises to a conical hill, 670 feet high; within 2 miles northward and northeastward of it are four low, hummocky, rocky islets.

Haiyung tao, 11 miles south-southeastward of Wuma tao, is 5 miles in extent north and south; its summit is a gently sloping peak, 1,320 feet high, and a ridge with two conspicuous rocky peaks extends northward from it. The northeastern part of the island, Gardiner island, 350 feet high, is a promontory detached at high water. Arch rock, 50 feet high, with a natural arch through it east and west, lies 1⅒ miles east-northeastward of Gardiner island; there is a depth of 25 fathoms in the passage between them. Bessie island, 1¼ miles southeastward of the island, is about ½ mile in length east and west, narrow, and has 3 hills on it about 120 feet in height; a rock which breaks lies about ¼ mile southwestward of it, otherwise the passage between Haiyung tao and Bessie island appears to be clear. Magnetic observations taken on Haiyung tao are considerably affected by its geological structure.

Chinanchiao rock, about 1¼ miles westward of the southwestern part of Haiyung tao, is about 30 yards across, with 5 feet on its shoalest head, 7 to 8 fathoms close-to, and 16 fathoms around; it is sometimes marked by a buoy. The southern extreme of Zöe head bears 27° 2½ miles from the rock.

Thornton haven, an inlet on the western side of Haiyung tao, is 1½ miles in length; its entrance between Zöe head, a bluff, 395 feet high, on the north, and a much lower point on the south, off which is Pinnacle rock on a projecting ledge, is ½ mile wide. There are depths of 7 to 11 fathoms at its entrance, which decrease gradually up the haven, and within ¾ mile from its head the water is shallow. Small vessels find shelter in 3½ to 4 fathoms, landlocked, although it is probable that a westerly gale sends in much swell; southwesterly gales are said to be unknown, and in summer the swell is usually from the southeastward or southward. The bottom at the head of the bay is stony and covered with long grass.

Fresh water was procurable in July at one or two small streams at high water. There is a small village at the head of the bay, inhabited by Chinese. The inhabitants of Haiyung tao are very poor, but a few fowls and vegetables possibly might be obtained. In summer this island is used for pasturage, and cattle are brought over from the mainland to graze.

Tides.—It is high water, full and change, in Thornton haven, at about 9h. 30m., springs rise 12 feet, neaps 8 feet. The day tide in July rose 3 feet higher than the night tide.

Blonde islands are situated 12 to 20 miles westward of Haiyung tao, are all much the same in character, having undulating ridges with deep ravines, bordered with high cliffy or rugged coasts.

East Blonde island (Sakhan tao) is high, the southern part having a peak 600 feet above the sea. Its northeastern point is a high cliffy bluff and the northwestern part is a narrow descending ridge terminating in a long sharp point, the outer part being nearly detached, and off which is a tide race. On the western side of the island are two rocky bays, and there is a rock awash 400 yards off its southwestern point.

Takhau tao lies 1 mile west-southwestward of East Blonde island, with a passage 17 to 20 fathoms in depth between. It is very steep on all sides, except its eastern point, which is low; its southern point is a bluff 600 feet high, with high cliffs. Pyramid rocks, 120 feet high, are ½ mile southward of the island and connected to its southern point by a reef, many parts of which dry at low water. Sharp rock, 1¾ miles east-southeastward of Pyramid rocks, has two peaks, the higher and northern of which is 50 feet high.

North Blonde island or Talin tao and Tosa tao, the two northern islands, lie close together east and west, Talin tao being situated ¾ mile northwestward of Takhau tao, with a deep channel between. The passage between Talin tao and Tosa tao, which are only of moderate height, has an islet in it, and is filled with reefs.

South Blonde island or Changzu do, the largest island of the group, lies 3 miles southwestward of the others. It is hilly and the two central hills of the island are about 480 feet high, with a deep valley between them. The northeastern coast is somewhat low, and divided into two bays; the southern coast is bold-to. A dry reef and some rocky ground with a rock awash extends ½ mile from the northern point of the island; the north coast of the island must be approached with caution. The population of the island is about 4,000, and the inhabitants are mostly fishermen, a regular trade being carried on with the fish, which are sent principally to Pitsuwo.

All the passages among the Blonde islands, except that between Talin tao and Tosa tao, seem deep and clear.

Shihchiao, a rock 4¾ miles southward of the southeastern point of Changzu do, is about 40 feet high, and a flat rocky ledge extends about 400 yards around it.

Rocks, awash at high water springs, extend for about 250 yeards to the southward of this island.

Anchorages.—Shelter from northerly winds may be obtained in 8 to 12 fathoms, at 400 to 600 yards southward of Talin tao; possibly also in the bays on the western side of East Blonde island, but these appear rocky; a small bay on the western side of Takhau tao is a bad anchorage, and affords but little shelter.

There is anchorage off the northern of the two bays on the northeastern side of Changzu do, in 17 fathoms, mud, sheltered except from northerly and southeasterly winds; and in the bay on the western side, in 7 to 10 fathoms, sheltered except between north-northwest and south.

Supplies.—There are fresh-water streams in all the ravines. Fowls, eggs, pigs, and vegetables may be procured in small quantities.

Tides and tidal streams.—It is high water, full and change, in the bay on the western side of Changzu do at 9h. 30m.; springs rise about 12 feet, neaps 8 feet. The tidal stream runs strongly between the islands of the Blonde group. During the first 2 hours' ebb it sets westward about 2½ knots an hour at springs. There is a tide race off the northern point of Changzu do, and another 3 or 4 miles westward of that island, over 17 to 20 fathoms, rocky bottom.

Elliot group consists of 9 islands, besides a considerable number of islets and rocks, forming an irregular chain.

Baka tao, the eastern island, is 8½ miles northward of Talin tao, with deep water between. The island is 320 feet high, and its eastern point is a cliff. There are several small islands between Baka tao and Sauchanshan tao.

Sauchanshan tao is one of the large islands of Elliot group, and its eastern point is about 1 mile westward of Baka tao. From its eastern point the southern coast trends southwestward 3½ miles to Hill point, a nearly detached head, and then northwestward the same distance.

On the southwestern side of Sauchanshan is a deep bay, at the mouth of which is Black rock, square and 70 feet high, with a rock awash 400 yards northwestward of it. Flat rock, 25 feet high, lies 1$\frac{3}{10}$ miles westward of Black rock and 1,200 yards south-southwestward of the western point of the island.

Rock.—A pinnacle rock, with 9 feet over it and 7 fathoms all around, lies 1,400 yards, 331°, from Black rock.

Sauchanshan is not quite so hilly as the majority of these islands. It is the most populated of the group, the number of its inhabitants being estimated at 7,000, who cultivate parts of the island with Indian corn and millet, and some are employed in fishing.

Dachanshan tao, the northern island of the group, extends about 9 miles east and west; its population is estimated at 2,000. This island is separated from Sauchanshan, Suili, and Kasian islands, to the southward of it, by a strait from about 1¼ to 2½ miles in width, which has several islets and rocks, both above and below water, in it. The northern coast of Dachanshan is mostly bare steep cliffs, with not a bay where even fishing boats can anchor. The eastern coast is similar, but it possesses a small bay, on the shores of which are a couple of villages. A sharp pointed peak rises at 2½ miles from the eastern end of the island; the western part of the island is hilly.

Suili tao, 1$\frac{3}{10}$ miles southwestward of Sauchanshan, is hilly. The eastern, southern, and western coasts are inaccessible and uninhabited; on the northern coast are two small bays, which afford anchorage for flat-bottomed boats. A ridge of rocks extends from the eastern coast of the island and terminates in a rock in the middle of the strait. The population of this island is about 600.

Wooded island, ¼ mile southward of Suili tao, is small and about 300 feet high.

Kasian tao, 1½ miles westward of Suili tao, is hilly and about 300 feet high. The southern coast is for the most part inaccessible; the northern coast is sandy, but there are some rocks off it.

Five Rock point, the southwestern point of the island, has a chain of large rocks extending from it. The island has about 900 inhabitants.

Kossin tao, northwestward of Kasian tao, is hilly, with steep rocky slopes. In the center is a swampy plain and a small lake. There are some 350 inhabitants.

Rocks.—At about 12°, 2¾ miles from the western end of Kossin tao, is a pinnacle rock, which dries about 3 feet, and at about 1 mile west-northwestward of this rock is a flat-topped rock, which dries about 5 feet.

Kwanglo tao lies westward of the Elliot group, and is 5 miles in length northeast and southwest. The southern point of the island is wild and rugged and rises steeply to a sugar-loaf peak 820 feet high. The summit of the island, a conical peak 1,000 feet high, is 1 mile farther north-northwestward. The remainder of the island is much lower and undulating.

A little eastward of the southern point of the island is a ninepin rock, and a rock which covers lies 68°, ½ mile from the point. Eastward of this, on the southern side of the island, is a bay with several rocks off its shores. It is open to the southward, but it is the only place for landing on this side of the island. On the other coasts of the island are a considerable number of small bays. The northwestern portion of Kwanglo is a low plain, which is skirted with reefs, lying along and nearly parallel to the shore at the distance of 800 to 1,200 yards, the greater part of which are covered at high water. Round island, lying 68°, 4½ miles from the southern point of Kwanglo and off the outer point of a narrow rocky island connected with Kwanglo by a reef, is 200 feet high.

Kwanglo has a population of 4,000 inhabitants, who are employed in agriculture and the coasting trade, for which they have some 40 flat-bottomed boats and junks. There are as many as 900 oxen and donkeys and a far greater number of pigs on the island.

There are numerous islands and rocks to the northward of Kwanglo.

Tides.—It is high water, full and change, on the western side of Kwanglo tao at 9h. 55m.; springs rise about 12 feet, neaps 8 feet.

Lump island, 5½ miles from the mainland and about a mile off the northwestern coast of Kwanglo tao, to which it is connected by a sand spit, is 200 feet high, and a long reef extends northward of it.

Yentoa bay, about 15 miles southwestward of Pitsuwo and northward of Terminal point, has many islets and reefs in it; and at its head, at the back of a high promontory, is the mouth of a river or the opening to a lagoon, named Wuhumun.

Triple islet, at 52°, 1 mile from Terminal point, has 3 hills about 200 feet high on it. A sand spit extends off the western hill, with a reef at its extreme, 200 yards off shore.

Rock.—At about 1 mile, 52°, from Triple islet is a sunken pinnacle rock, which is about 12 feet across and steep-to.

A red spar buoy has been temporarily placed in 18 feet water on the northern side of the rock.

Anchorage.—There is anchorage in Yentoa bay in 5 to 9 fathoms, but it has not been surveyed, and as the soundings taken indicate uneven rocky ground, caution must be used in navigating in it.

Terminal point, southward of Yentoa bay, is the eastern point of the hilly country stretching 20 miles northeastward of Talienhwan. The head is a bluff 380 feet high, with cliffs extending for ½ mile along its southern face, off which there is usually a tide race; it is connected with the main by a narrow sandy isthmus, which separates it from the eastern of 3 ranges of lofty hills, the western of which is a conspicuous peak, 1,000 feet high, rising from a plain. At the foot of these hills a low, indented, rocky coast fringed with reefs and islets trends west-southwestward for about 6 miles.

Kwang tung peak, a hump-shaped mountain, 1,580 feet high, is 14 miles northwestward of the head.

Reef point, 7 miles southwestward of Terminal point, is the southeastern point of a rocky peninsula, the greatest height of which is 150 feet. The bay northward of Reef point is very shallow at its head, and open southeastward, from which direction there is usually a swell in summer, even in fine weather. A reef dries 5 feet at ½ mile southward of the point, which should not be passed within 1 mile, nor the reef within 1,200 yards. Rock islet, 40 feet high, lies 800 yards eastward of Reef point, and a chain of rocks just covered at high water extends about 1,200 yards north-northeastward of the islet.

Peaked reef, lying 2½ miles southwestward of Reef point, has several small pointed rocks on it of a yellowish color, of which the largest is 15 feet high. The rocks extend 400 yards east and west. Discolored water was observed at 1 mile northeastward and at 1,200 yards southwestward of the reef; this discoloration might have been caused by the current.

Stream bay.—Stream bay lies between Reef and Robinson points; both its shores, under the hills, are rather low and very rocky; its head is a sandy beach, on the border of a plain, off the middle of which is a square rocky islet. A stream of fresh water flows through the western end of the beach, but the entrance is sometimes closed, and there are several rocks off it. A conspicuous peak, 900 feet high, on a range, rises at about 5½ miles westward of Reef point, with a hill, 700 feet high, fronting it to the southeast, which falls to Robinson point, bold and wooded.

Shen hwan and Tau Yau Ku, or Blackney and Kerr bays, are two inlets situated between Robinson point and Hooper point, a long narrow promontory terminating in Ellis point dividing them. Both inlets are very shallow at their heads, open southeastward, and, therefore, to the summer ground swell. Kerr bay, the western and larger of the two, has good anchorage in 3 to 5 fathoms.

Tidal streams.—At about 1 mile southward of Robinson point the whole of the ebb stream set westward at a rate of ¼ to ½ knot. During the first hour of the flood the stream set westward ½ knot; during the second hour it was slack; during the third, fourth, and fifth hours it set east-northeastward to north-northeastward ½ knot.; and during the sixth hour, west-southwestward ¼ knot.

Dangerous reef, nearly awash at high tide, lies 94°, 4 miles, from Hooper point and is about ¼ mile in extent, the largest rock being 11 feet above low water.

Round island, in Lat. 38° 40′ N., Long. 122° 11′ E., is small, round topped, and 200 feet high. The depth at ½ mile from it is 25 fathoms, mud and shells.

Encounter rock, in Lat. 38° 33′ 50″ N., Long. 121° 39′ 30″ E., is about 70 yards in length east and west, has 23 and 26 fathoms close to, and on northerly or southerly bearings it appears like a patch of small rocks, though in reality but two. The eastern and larger rock is 11 feet above high water and steep-to. At night it should be given a wide berth.

Tides and tidal streams.—It is high water, full and change, at Encounter rock at 10h. 44m.; springs rise about 11 feet; neaps 8 feet. The tidal streams in the vicinity are somewhat rotary, and from a few observations made at full and change appear to set as follows: During the first 3 hours flood, preceding the moon's transit, the stream sets eastward weakly; it then turns and sets west-northwestward ¾ knot, and it continues to set in this direction during the ebb at 1 to 1½ knots. During the following flood it sets for the first 2 hours north-northeast weakly, and during the third, fourth, and fifth hours east-northeastward 1½ knots; during the sixth hour it turns and sets west-northwestward, which direction it keeps for the first 2 hours of the ebb, but with no strength. During the last 4 hours ebb and for the first 3 hours flood it then sets weakly eastward.

Talienhwan.—This bay is 6 miles wide between Probyn head, the southwestern point of Taikushan peninsula, which forms the northeastern side of the bay, and West Entry point, on the western side, and it is 6 miles deep, with Hand, Junk, and Victoria bays at its head. The holding ground is excellent; the eastern side of the bay affords the best sheltered anchorage in summer.

Its principal approach, between West Entry point and the two Sanshan islands, is 5 miles wide. There is also a passage 1 mile wide between these islands and another 2 miles wide between North Sanshan and the eastern point of entrance. These channels appear to be clear of danger.

Sanshan islands, two in number, lie north and south of each other at the entrance of the bay and reach a height of 470 feet. They may be approached to ½ mile, and, except on northerly bearings, appear to consist of 3, as the southern island is divided by an isthmus of small bowlders and shingle about 10 feet high, the portions north and south of which are hilly. When passing between the two islands avoid the 6-fathoms mud banks, one lying ½ mile south-southeastward of the northern island and the other ¾ mile southeastward of the northeastern point of the southern island, which have not been closely examined and on which there may be less water.

Light.—A revolving white light, every 15 seconds and visible 22 miles, is exhibited on the southern extremity of South Sanshan tao. It is 257 feet above high water, and should be seen between the bearings 249° and 165° over an arc of 276°.

Odin cove, lying directly northward of Probyn head, is about 1 mile broad at the entrance and ¾ mile deep. The northern side of the cove is rocky and should be avoided; the other parts are clear, and there is shelter with good holding ground for a number of vessels properly moored. The reef off Breaker point is covered at high water; there is a boat passage between it and the land.

Small vessels approach the watering place on the northern shore and anchor as convenient by keeping the Sanshan islands completely shut in by Probyn head. This mark leads eastward of all the rocky patches extending off the North Middle. Vessels drawing 10 to 12 feet anchor off the village.

The best landing place is on the southern side of the cove, where at low water the boat should be beached, but at high water, with care, she can be taken alongside the rocks on the eastern side of the bluff. Landing may also be effected, at high water only, off the middle of the village. There is landing at any time of tide on the beach at the watering place, but not with a southwesterly swell.

Tides.—It is high water, full and change, in Odin cove at 10h. 40m.; springs rise 11 feet, neaps 7 fet. The stream during the rising tide sets round the cove from north to south, and during the falling tide in the opposite direction.

During August the forenoon tides were the highest, and the difference at springs between the forenoon and the afternoon tides amounted to 3 feet.

Supplies.—The inhabitants are civil and willing to trade; sheep, poultry, and eggs are plentiful, also fish; but the oysters are unwholesome. Game is not abundant, but pigeons are numerous on the southern side of the cove and round Probyn head.

The flat country at the foot of the hills surrounding Talienhwan appears to be good arable land well cultivated. Large quantities of a kind of dwarf Indian corn, millet, and wheat (kaouliang) are grown on it. Vegetables are scarce, and from the latter grain above mentioned a spirit is distilled.

The hills afford grazing for sheep and cattle, and hay is preserved for winter consumption. In exchange for their grain and sheep the natives bring cloth, tea, sugar, etc., from Shantung. About the end of February junks cross over to the Korean coast to catch salmon.

Wood is very scarce, the country being entirely destitute of timber. Water is procurable on the northern shore of Odin cove, and in smaller quantity from a little cove ½ mile northward; at either place an engine and good length of hose are required. There appears to be no water on the western side of the bay, except after rain.

Hand bay, in the northern part of Talienhwan, is quite landlocked, and affords excellent anchorage for small vessels of 10 feet draft. A reef, 1,800 yards long, and dry or nearly so at low water, extends westward from the western side of the bay to a position at 1 mile northward of the eastern point of Ho shang shan peninsula.

Mount Sampson, 2,210 feet high, lies about 10° 4 miles from the eastern entrance point of Hand bay.

Junk bay is open to the southward, the town of Ryu ju is located on the eastern side of the bay, an iron pier extends about 200 yards out from the town.

Buoy.—A red conical buoy, moored in 3¾ fathoms of water, marks a shoal in the southeastern approach to Junk bay.

Victoria bay, in the western part of Talienhwan, affords good sheltered anchorage, except from winds between east-northeast and east-southeast. It is probable that in spring and summer the prevailing winds are southwesterly, southerly, and southeasterly, occasionally easterly, and if the wind from the latter quarter blows with any force a heavy swell must set in.

Dairen (Dalney), which was formerly a Russian port (leased for 25 years from China), was, by the treaty of peace signed at Portsmouth, N. H., September 5, 1905, ceded to Japan; the lease included Port Arthur (Ryojun ko) and adjacent territory and waters, and also the railway between Chan Chun and Port Arthur and the coal mines worked in connection therewith.

The harbor works cover a sea frontage of about 1½ miles, but the only part at present available for steam vessels is in the working harbor in its western portion; this part has a depth of 12 feet in the entrance, and it is sheltered by a stone quay on its northern side which runs eastward for about 300 yards; the western side of this harbor is faced with stone. A small fixed red light is shown from the quay end.

Five piers, varying in width from about 60 to 380 feet, and in length from ¼ to ½ mile, are to extend off the shore, and are to have berths for seagoing vessels to lie alongside to unload and load cargo. Each of the piers is to be supplied with railways, warehouses, electric light, water, etc.

A breakwater, commencing some distance eastward of the outer end of the eastern pier, will run northwestward parallel to the shore and at right angles to the piers, and it will be extended until it is sufficiently long to protect the harbor from northerly gales. The eastern entrance to the harbor, between the northern end of the eastern pier and the breakwater, is to be about 150 yards in width.

Ice.—In former years in winter and usually in January this part of Victoria bay was said to freeze slightly, but not sufficiently to prevent vessels entering or leaving. It is, however, doubtful whether, in an inclosed area, unruffled by wind or swell, this freedom will continue, and it is stated the harbor was frozen up during the winter 1901–2.

Directions.—In clear weather mount Sampson bearing 5° leads through the main entrance to Talienhwan bay.

In foggy weather, so common in spring and early summer, other peaks, which show out from time to time above the fog, may be mistaken for mount Sampson. Do not then stand into the bay unless the land is properly identified, or Round island or San shan tao have been made. Prominent peak 12 miles westward of West Entry point is frequently the first to show out in foggy or hazy weather.

In strong northwesterly to southwesterly winds heavy squalls come off the hills about West Entry point.

The chimney of the power house at Dalny is conspicuous.

In approaching Dairen (Dalny) bear in mind that the submerged portions of the breakwater and piers under construction may be dangerous.

The town to the south of the harbor is intended to be divided into three great parts—the official town, the commercial town on the east, and the Chinese town on the west. The two latter are to be separated by a park.

The official town in which are workshops, railway headquarters, offices, residences of employees, churches, schools, hotels, etc., is situated on a small peninsula on the west; it is nearly completed and contains a large area of streets and substantial buildings.

The Chinese town faces on the bay and is distinctly separate, with docks and junk shipping adjoining. The whole site slopes gently to the sea from a range of bare hills rising southward of the town to a height of 600 feet.

It is a free port for imports into and exports from the leased territory of Kwang tung. Vessels of all nations are permitted to trade between this port and the open ports in Japan.

A wireless telegraph station has been established on the 724-foot hill, situated westward of West Entry point.

Dock.—The dry dock is 330 feet long on blocks and 380 feet over all. The entrance is 43 feet wide at high water springs and 30 feet wide at the sill. The depth on the blocks is 16 feet.

Repairs.—Only small repairs to machinery can be executed.

Buoys.—A wooden triangular buoy, painted red and marked by the letter "B" in white, is moored 100 yards to the northward of the 1½-fathom shoal, which is located about ½ mile northward of the red light on the end of the jetty on the western side of the harbor. Only light-draft steamers should pass southward of this buoy.

A black conical gas buoy with cylindrical framework as topmark, from which a white light will be exhibited, is moored at the western end of the breakwater in 4½ fathoms of water.

A red conical gas buoy with cylindrical framework as topmark, from which a white light will be exhibited, is moored at the eastern end of the breakwater in 4¼ fathoms of water.

A black conical iron buoy is moored in 4 fathoms of water 800 yards 81° from the Dairen railway pier head.

A red conical iron buoy, surmounted by a triangular topmark, is moored in 3¾ fathoms, 920 yards 312° from the light on the quay head.

A red conical buoy marked with the letter "A" is moored in 4¼ fathoms of water 93° distant, about ⅜ mile from Gyu bin seki, 2 feet high.

The gas buoys mentioned are not lighted at present.

The coast from West Entry point of Talienhwan trends south-southwestward 2¾ miles to South Entry point, which is shelving, with a low islet surrounded by reefs together extending southwestward ¼ mile from it. In the middle of this coast is a small sandy bay, off which is Pantsui tao, or Wedge island, sloping eastward and bold to, but with breakers inshore of it.

Cambrian cove (Ro ko nada), the entrance to which is ¾ mile wide between South Entry point on the east, and two sharp, prominent, rugged hills on the point to the west, appears to be a good temporary anchorage, especially in northerly winds. The navigable part is 1,000 yards deep, the soundings decreasing from 15 to 17 fathoms at the entrance to 4 fathoms at ¼ mile from the eastern bight at the head of the bay, where there are some reefs. There is another bight in the northwestern part of the cove apparently dry at low water.

The coast for 2¾ miles westward of Cambrian cove is formed of steep hills and cliffs; then there is a deep valley, whence the coast, with rocks 600 to 800 yards off, bends northwestward 2 miles to North Oyama point, which is conspicuous. A small stream through a plain faced by a sandy beach falls into the sea close westward of this cliff.

East and West Dairen islands.—Two islands, 95 and 122 feet in height and 400 yards east and west from each other, lie ½ mile offshore at 2½ miles westward of the western entrance point of Cambrian cove. Shoal water extends off the northern sides of these islands; the southern sides are steep to.

At about 1,600 yards south-southwestward of these islands there is a smooth-topped island about 100 feet high, with a reef off its northwestern part; a small pinnacle islet lies ½ mile eastward of it. There are 13 and 14 fathoms, mud and shells, in the channel between this island and those to the northward, but in mid-channel, one cast was obtained of 5 fathoms, coral.

Gap island, 2¾ miles south-southwestward of the smooth-topped island, is about 280 feet high; the western side is a cliff rising vertically to the summit, whence the island slopes eastward. On westerly to southwesterly bearings the island appears round, and on other bearings it is wedge shaped. The island is steep to, and an islet lies 400 yards southeastward of it.

The coast from North Oyama point trends southwestward 6 miles to the rocky peninsula, Pingtu tau, forming a bay, but there are depths of 6 to 7 fathoms not far offshore. This coast is broken and rocky, forming small bays and points, with reefs extending 400 to 600 yards off in places. The land near the sea is a line of low hills, but at the back is an amphitheater of high hills, in the middle of which, at 3½ miles inland, rises Pu tu shan, or Prominent peak, about 1,000 feet in height. The southern part of the range is a high table, the slopes of which break into the sea.

Pingtu tau, a narrow, rocky peninsula, 248 feet high, bordered by a cliff, is little more than 1 mile in length, lying parallel to the low coast of the mainland, to which its central part is connected by a low isthmus, with a village on it. A group of 5 islands lies from ½ to 1½ miles off its eastern point. There are bays on both sides of the isthmus, with low and sandy shores, Tung kau being on the northeastern side and Si kau on the southwestern.

Anchorage can be obtained in Tung kau in 3 to 8 fathoms, with some shelter from the islands, but a reef in its northern part contracts the inner anchorage to a space of 6 cables. There is a reef 600 yards from the northern shore of Si kau, eastward of which and close to the isthmus a small vessel may anchor in 4 fathoms, well sheltered except from the southwest.

There is anchorage outside Si kau in 16 fathoms, good holding ground, with the western point of the peninsula bearing about 105°, distant ½ mile, sheltered from northwesterly to easterly winds but open to southerly and southwesterly. The bottom is uneven. Water may be procured in small quantities from the shore northwestward of the anchorage; wood is scarce; cattle were numerous.

The coast from Pingtu tau is steep and trends westward for 3½ miles, when 3 valleys occur; thence it continues westward for 4½ miles, when it turns southward and southwestward for 2 miles to Lao lui chui, or Swainson point, from which a reef extends about 300 yards southeastward. This coast has generally deep water at ½ mile off it, but in Takhe bay, the bight at 8 miles westward of Pingtu tau, reefs and shoal water extend off about 800 yards, and it then gradually deepens.

From Lao lui chui the coast continues westward for nearly 2¾ miles to the entrance of Port Arthur (Ryojun ko), the eastern entrance head of which is 410 feet high. A reef extends 700 yards southward from some cliffs at 1½ miles westward of Lao lui chui.

Lutin rock, about 400 yards southwestward of the extreme of this reef and 114°, 1$\frac{2}{10}$ miles, from the lighthouse on the western entrance point of Port Arthur, is small, covers at high water, and is marked by an iron post with spherical topmark, painted red, elevated 17 feet above high water, and standing on a concrete base. Lutin rock dries 9 feet.

Lao lui chui—Rock.—A rock, with a depth of 4½ fathoms over it, is situated at a distance of 480 yards, 140°, from Lao lui chui. A rocky head, with 2½ fathoms of water over it, lies a short distance northwestward from the above. There are depths of 12 to 17 fathoms around these rocks.

Port Arthur (Ryojun ko).—The lease of this harbor and the adjacent seas and territory to the north was ceded by Russia to Japan in September, 1905.

The harbor is a large inlet having an entrance about 300 yards wide, the channel through being narrowed by shoal water to about 100 yards. The channel extends ½ mile northward and widens at its head; the upper part of the inlet is filled with mud flats. On the eastern side of the harbor is the East port, a tidal basin about 500 yards long, 350 yards wide, and 23 to 25½ feet deep.

On the western side of the harbor channel and of the peninsula, named Tiger's tail, is the West port, which is being deepened, and an area of about 3,400 yards in length and 2,200 yards in width will probably be dredged to a depth of 30 feet in the center, 22 feet on each side of the center, and 17 feet along the shore. At present there is sufficient deep water for six battle ships to lie at moorings.

The harbor is not closed by ice during the winter.

Port Arthur being a naval port, no foreign vessels of war or merchant ships may enter without permission.

Wrecks.—The entrance to the harbor is (1906) partially blocked by wrecks, which are in process of being removed. Until this has been accomplished it is advisable to obtain local aid before attempting to enter.

Lights.—An intermittent white light with red sectors—thus, light 14 seconds, eclipse 2 seconds; light 2 seconds, eclipse 2 seconds—is exhibited from a small white building 7 feet high close to the southeastern side of the old light-house, which is painted white and black in horizontal bands. The light shows white between the bearings of 9° and 301° over an arc of 68°, red inshore of 9°, and red between 301° and 275°, white between 275° and 216° over an arc of 59°. The white light is visible 8 miles and the red light is visible 5 miles.

A fixed white light is exhibited on the mast of the signal station of Fort Whang Chin San, on the east side of the entrance to the harbor.

Two fixed red lights, exhibited from stone supports, painted in black-and-white bands and located at the base of the hill and known as the Colline aux Cailles range, bearing 356° 30′, lead into the harbor.

Fog signal.—A gun is fired three times, at 1 minute intervals, on a vessel's underway fog signal being heard, and the signal is repeated after 15 minutes if the vessel's signal continues to be heard.

Outer anchorage.—There is open anchorage in 6 to 7 fathoms at ½ to ¾ mile off the entrance of the port, but vessels are unable to stay there with the wind from seaward.

Navigable depth.—The least depth in the port entrance channel on the leading mark is about 24 feet at low-water springs.

A wireless-telegraph station is situated on Golden hill.

Port regulations.—The following signals will be made by means of the International Code when vessels of over 50 tons are entering or leaving Port Arthur:

When an incoming vessel approaches Lutin rock, code flag H will be hoisted first on Hwang chin shan fort flagstaff and then on the harbor master's flagstaff.

When a vessel is about to leave the port, code flag P will be hoisted first on the harbor master's flagstaff, then on Hwang chin shan fort flagstaff.

These flags will be kept flying until the incoming vessel has anchored or the outgoing vessel passed the Lutin rock.

When code flag H is flying, outgoing vessels are prohibited from leaving, and when code flag P is flying, incoming vessels are prohibited from passing to the westward of Lutin rock.

Outgoing vessels must inform the harbor master's office beforehand of the time at which they propose leaving.

When a vessel over 1,000 tons is entering or leaving the eastern port, code flag B will be hoisted at the harbor master's office; when this flag is flying all vessels and boats must keep clear of the entrance.

Dock.—The dry dock, 500 feet long on blocks, 72 feet wide, with 30 feet over the sill at high water springs, is in the northeastern part of the tidal basin.

Repairs.—The dockyard contains joiners', pattern makers', blacksmiths', boiler and fitting shops, 2 large and 2 small steam hammers, and a brass foundry.

Tides and tidal streams.—It is high water, full and change, in Port Arthur at 10h. 45m.; spring tides rise 9 feet. Off the entrance the west-going stream runs from about 2 hours after low to 2 hours after high water, and the east-going stream from 2 hours after high to 2 hours after low water. The rate of the stream in Port Arthur is from 1 to 3 knots.

Liaotishan promontory.—From the western entrance head of Port Arthur the coast trends about 219° for 5 miles, and then turns 272° for 3 miles along the southern face of the Liaotishan promontory, and 338° for 3¼ miles to Race point. Liaotishan, a mountain 1,512 feet high, at 1$\frac{3}{10}$ miles northwestward of the southeastern extreme of the promontory, being separated from the hills northward by a plain, looks from a long distance like an island. The mountain slopes gently and evenly from its summit, though broken by ravines and edged by cliffs at its base. The southern face of the promontory is high, bold, and steep-to.

Light.—A group flashing white light, consisting of groups of 2 flashes every 30 seconds and visible 25 miles, is exhibited from a cylindrical iron tower, painted white, 52 feet high and 315 feet above high water, located on the southwestern slope of Laiotishan promontory. It illuminates an arc of 245° between 168° and 283°.

Liaotung gulf, eastern shore.—From the southwestern extreme of Liaotishan promontory the hilly and bold coast of Kwangtung peninsula trends northward for about 13 miles, and in it are 2 bays, the southern of which, Pigeon bay, has anchorage in 4 fathoms, sheltered except from westerly winds. Louisa bay, 5 miles northward, is a shallow inlet with the small Ellis Saddle island within the entrance, outside of which there is anchorage in 6 fathoms, also sheltered except from westerly winds.

Louisa bay—Rocks.—A rock, with a depth of about 1 foot over it and 8 to 9 fathoms around, is situated on the approach to Louisa bay, with cape Collinson summit bearing 3°, distant nearly 3½ miles.

A rock with a depth of 6 feet over it is situated about ½ mile eastward of the above and at a distance of 1 mile, 210°, from the northwestern extremity of Ellis Saddle island.

Reef island, 4 miles off Louisa bay, is about 400 feet high; a reef extends 600 yards from its southern point, and a rock, which uncovers 4 feet at low water, lies 288°, half a mile from its western point. The tidal streams here run strongly with eddies off the rock.

Iron island (Sihau Shan) lies 6 miles off the northwestern part of Kwangtung peninsula; it is 750 feet high with a somewhat flat summit, and its sides are cliffs; it has not been examined within 1½ miles on either side, but its appearance indicates a bold approach.

Society bay is about 29 miles across at its entrance between cape Collinson and Petermann point, and it is 20 miles deep, its head branching into 2 arms, separated by a hilly promontory. Kinchau bay, the southern arm, approaches within 1½ miles of Talienhwan; the northern arm is Port Adams. Convenient anchorage may be found anywhere and shelter under the groups of islands in the bay.

The southern shore of the bay from cape Collinson to Wedge head, a distance of 16 miles, is indented under an irregular mountain tract. Wedge head lies northward of a detached range, the shore along which is bold, but a patch of rocks which uncovers at a quarter ebb lies 1,400 yards off Cave point, 4 miles southwestward of the head.

Wedge head, the northern face of which is cliffy, should be given a good berth, as both its sides are skirted by reefs and the bays on either side are shoal. In the western bay a rock awash lies 800 yards off the western part of the head; in the eastern, a large reef, of which several patches uncover and which is very steep-to, stretches 1 mile eastward from the head.

From Wedge head the shore trends eastward to the head of Kinchau bay and appears clear. Warren cliff, high and of a dark color, and a smooth, bare cliff 1 mile eastward of it, are conspicuous.

Kinchau bay.—The small walled town Kinchau, usually called Southern Kinchau, stands on the plain at the head of the bay and at the base of the hills on its northern side. There is a large station of the Chinese Eastern Railway at 1$\frac{6}{10}$ miles eastward of the town. On the northern point of the bay is Osborn peak, 720 feet high. Fishbourne island, 290 feet high, a smooth, round hill, with cliffs to seaward, lies ½ mile off the coast. Close northwestward of Fishbourne island is the best approach to Port Adams from the southward, and inside of it there is a passage of 13 feet.

Kinchau bay is very shallow with a soft mud bottom, excepting a 13-foot bank of fine sand, 1 mile wide, extending 5 miles southward from Fishbourne island, and on which is a 10-foot rocky patch, 193°, 2 miles from the western point of that island. This bank is a continuation of Long bank from port Adams.

At the head of the bay the mud dries 1 mile, and the shore is only approachable at high water.

Sulivan bay.—Northward of Osborn peak is a shallow bay divided into two parts by Drury island, which is low and hilly. Both parts are very shallow, the northern, Sulivan bay, being the better of the two. Entry island, having bold cliffs seawards, lies off a hilly promontory which is the southern entrance point of port Adams.

Murchison island, 210 feet high, 18°, 11 miles from cape Collinson, and Milne island, 180 feet high, 70°, 3 miles from Murchison island, are the largest of a group of islands and rocks, with foul ground lying between them.

A rock, with 1 foot water over it and 3 to 6 fathoms around, lies 400 yards southward of the southeastern point of Murchison island, with which it appears to be connected by a reef.

An islet, with a reef extending southward from it, lies ½ mile northwestward of Murchison island; and a rock lies 400 yards eastward of Milne island. There is also an islet eastward of Murchison island, some rocks with reefs off them westward of Milne island, and a patch of 9 feet midway between the islands.

A bank of fine sand, carrying about 4 fathoms, extends north-northeastward about 7½ miles from Murchison island, with a breadth of 1 to ½ mile; the shallowest part of the bank, 22 feet, is 5 miles from the island; its edges are steep-to, especially on the west. The best anchorage is on the southern side of Murchison island.

Ripon island, 250 feet high, about 4 miles westward of Fishbourne island, and Everest island, ½ mile northeastward of Ripon island, are undulating. There are several small islets and reefs northeastward and southeastward of Ripon island, but the western parts of Ripon, excepting a fringe of reefs 200 yards broad, are clear.

In the passage between Ripon and Everest islands there are two patches of 7 feet, with 12 feet between them; and a rock which uncovers at a quarter ebb lies 124°, 1,200 yards from the southeastern point of Ripon island, with a 4-foot patch 400 yards nearer the point.

Sykes rock, a reef with an islet on it and a dry rock on its northern end, lies ¾ mile northward of the northern point of Everest island. At 200 yards southward of Sykes rock is a flat reef which uncovers at half tide, with a 3-fathom passage between it and Everest.

Coffin island, 2 miles northward of Everest island, is small, flat-topped, and 100 feet high, with a reef extending 400 yards westward from it.

Guide rock, 1,600 yards northeastward of Everest island, is 20 feet high, and a reef extends about 600 yards southward from it.

Flat islet, 14°, $2\frac{8}{10}$ miles from Coffin island, is 20 feet high, and a cleft runs through it from east to west; reefs seem to extend about 200 yards from its points.

Awash reef, about 1½ miles northward of Flat islet, and 2 miles westward of Frazer island, is ½ mile in extent east-northeast and west-southwest; parts are awash at half tide.

Frazer island, 2 miles northeastward of Flat islet, is 100 feet high, rather flat and rocky, and there is a small pagoda on it. The island is at the end of the dry banks which stretch off the shore at the northern side of the entrance of port Adams, and it is connected with the shore by an elevated ridge of sand which covers at high water.

Long bank is a continuation, for 12 miles in a southerly direction, of the banks on the northern side of port Adams. It is fine sand, with depths of 7 to 9 feet off the port and 12 to 13 feet at other parts, except northwestward of Fishbourne island, where there is a break in it 1 mile wide carrying about 16 feet.

Cone head, 3 miles north-northwestward of Frazer island, is 600 feet high; westward of the head is a deep inlet which is connected with Tung tzia kao, a bay farther westward. This inlet nearly all dries, and the approach to it is shallow, but junks cross its flat at high water. A double-topped islet, 120 feet high, lies off its entrance at about 256°, 1¾ miles from Cone head, and Triangle islet, 180 feet high, at about 162°, 1 mile from the head. Hoh peak, the summit of the large island which separates these inlets, is about 900 feet high. The southern coast of Tur tau is 5 miles in length and is bold except off its southern and western extremes, where rocks extend 500 yards.

Port Adams, an arm of the sea 18 miles in depth, is navigable by a channel 400 to 1,600 yards broad, made by the scour of the tides which fill its basin, there being only two or three insignificant streams falling into its head.

Navigability.—Port Adams can be entered at high-water springs by vessels drawing 21 feet, and at low water by vessels drawing 13 feet. Strong winds influence the level, the range observed being about 2 feet. It has been asserted, on doubtful authority, that the level of the gulf is much reduced by certain winds at the latter part of the year.

Supplies.—There is neither town nor trade in this inlet; villages though small are numerous, and the largest is near the upper part of the inlet on the southern side. This side is very fertile and well cultivated, but the northern side, being the steep slopes of a range of limestone hills, is barren. Lime can be procured. Sheep, fowls, eggs, geese, shrimps and prawns, and black grapes were purchasable; cattle were numerous. No streams accessible for water were discovered, although the country is well watered. The Chinese Eastern railway and the great highway road from Newchwang to Korea pass near the head of port Adams.

Tides.—It is high water, full and change, at Sulivan bay at 0h. 15m., springs rise 8 feet; at Mary island (10 miles within port Adams) at 2h 0m., springs rise 10 feet, neaps about 7 feet. At the head of the port the tide is half an hour later than at Mary island.

Directions.—From the southwestward pass 1 mile southward of Ripon island, or keep Osborn peak in line with the cliffs of Fishbourne island, 78°, which mark leads southward of the foul ground southward of Everest island; when Coffin island opens eastward of Everest island bearing 353°, steer 58°, or keep the highest part of the range, 700 feet high, in line with the western summit of Drury island, which leads over Long bank in 16 to 18 feet at low water, at 1,200 yards northwestward of Fishbourne island.

When Entry island bears 8° keep it on that bearing, altering course to pass close westward of it in 30 to 16 feet, but more than 16 feet can not be relied on, for a patch of rock with 16 feet over it appears to extend ½ mile westward of Entry island; this, however, is doubtful. To pass outside this patch, when 1 mile southward of Entry island, bring Osborn peak on with the nearest western point of Drury island, about 153°, and when the northern point of Entry island bears 96°, steer 49° up the channel for the Passage islands, which appear as one small rounded islet; but when rounding Entry island with the ebb tidal stream guard against being set on Long bank.

From the northwestward, pass northward and eastward of Coffin, because the ground between Coffin, Guide, and Sykes rocks has not been sounded, and then pass 1,000 yards eastward of Guide rock, keeping about 153° till Sykes rock opens southward of Guide rock, about 284°; proceed in with this mark on astern and Key peak ahead till Entry island bears 344° when alter course for it, and continue as above directed; but Long bank may be crossed in a least depth of 12 feet by steering in with Entry island bearing 86°.

In the inlet, pass 600 yards northwestward of Upright rock, which is on the edge of a rocky shoal.

There is snug anchorage in a blind channel between Passage islands and Long island, for which pass 400 yards southward of the Passage islands, with Kwangtung peak, 1,580 feet high, in line with the outer extremity of the rocks off the northern point of Long island, 88°, and anchor in 5 to 7 fathoms.

To continue up the inlet, when 1 mile below the Passage islands, open the northeastern island just northward of the southwestern island, which leads up in 13 feet at low water springs. The ground below these islands is rather rocky and uneven. Pass 400 yards northwestward of the Passage islands and steer for Channel bluff, the northwestern point of Mary island, 460 feet high, keeping it on with the part of White House peak it may be then in line with, about 49°. At about 1 mile above Passage islands the depth decreases 3 feet, when steer about 63° allowing for the tidal stream, hauling up again with the peak a little open of the bluff, and steering to pass ¼ mile westward of Harold island, and a similar distance eastward of the island off Direction head; above this the channel is only ¼ mile wide, the depths increase to 6 and 8 fathoms, and the channel sweeps round the northern side of Mary island.

After passing the island off Direction head, keep the Passage islands just open of that island till the northern point of Mary island bears 109°, then steer for White House peak, and alter course southeastward and southward as necessary to keep in mid-channel. The banks extending 600 yards westward and northward of Mary island are very shoal and studded with rocks near the shore. Tide.Pole rock, two square bowlders placed vertically and 15 feet high, marks the southern steep edge of the channel at ½ mile above Mary island.

There is anchorage here in 7 to 9 fathoms, or 1 mile higher up in 6 to 7 fathoms. The channel to the head of the inlet is 400 to 600 yards in breadth, with a depth of 5 fathoms for 1½ miles above the northern point of Mary island, 2½ fathoms for 6 miles above, and thence decreasing to 1 fathom at 8 miles above. Shoal inlet, northwestward of Mary island, is filled with a shallow mud flat, having only a narrow channel fit for small junks.

Po lo tao—Petermann point, the northwestern entrance point of Society bay, is the southwestern extreme of the hilly ranges of Po lo tao, an island on the western side of Tung tzia kau. The southern point of the island is high, bold, and cliffy. Sand Hill bay lies on the western side of the island between a point at 800 yards northward of Petermann point and from which rocks extend 800 yards, and South point at 1½ miles further northward. The sand covering the lower part of the hill slopes all along the bay is conspicuous. South point rises to a smooth round hill.

Tung tzia kao, the entrance to which is between Ridge point and the southeastern part of Po lo tao, is shoal and open from south to southwest. The mud flats dry out as far as the two reefs northward of Ridge point, the eastern and higher reef marking the eastern side of the entrance to a small channel which carries a depth of 12 feet for 1 mile, but on the bar at its entrance there is a depth of 6 feet. Junks cross the flats at half tide.

From the head of Tung tzia kao there is shallow water communication with Fucho bay, passing eastward of Chinghang island.

Hulushan bay, between the northwestern side of Po lo tao and the southwestern part of Chinghang island, affords anchorage in depths under 9 fathoms, good holding ground of sand and clay inside its entrance points, which are 5¾ miles apart, sheltered except from westerly winds, to which the bay is open. Small vessels anchor on the northern side of the bay sheltered from northwesterly winds, or on the southern side sheltered from south-southwesterly winds.

There is shallow water communication with Tung tzia kao from the head of the bay by passing southward of Calabash point, a low, projecting head, the southern extreme of Chinghang, close to and outside which is a bar with 6 feet on it at low water springs. The channel for 5 miles above Calabash point.carries from 9 to 24 feet water.

North point, the southwestern extreme of Chinghang, is an abrupt cliff, and from it the coast, part of which continues cliffy, trends northward for 1¾ miles to Reef point. The land rises irregularly from the sea to a height of 1,030 feet behind North peak, which descends steeply eastward to a plain, so these hills make as an island.

There is a village on the plain under the red hill northward of Calabash point, but the villagers are very poor, and supplies can not be obtained.

Tides.—It is high water, full and change, in Hulushan bay at 2h. 30m.; springs rise about 8 feet, neaps 6 feet.

Reef point is the low termination of a small hill 240 feet high; the rocks off it are steep-to. The coast of Chinghang island falls back 1 mile from the point and then continues northeastward for 4½ miles to Slaney head. At ½ mile northeastward of Reef point and the same distance off the shore is the commencement of a rocky bank which runs 1 mile parallel to the coast, with 7 to 12 feet water over it and 5 to 7 fathoms inside it.

Slaney head, 420 feet high, is a round headland with abrupt cliffs; a reef extends ½ mile northeastward from it. The shore from the head trends east-northeastward for 7 miles to Table point, and it is bordered by shoal, rocky ground, with some patches of dry rock. Irregular ground of 9 to 11 fathoms stretches 345° 8 miles from Slaney head.

Russell rock, 58°, 3 miles from Slaney head, is awash at high water; there is a depth of 9 fathoms at 600 yards northward of it, while at the same distance east-southeastward of it the depth is 4 fathoms.

Fuchu point, the north point of Fuchu bay, is low table-land, 100 feet high, and extending 1 mile westward from it is a reef, the outer part of which dries; there are 5 fathoms at 400 yards outside of them.

Fuchu bay is 11 miles across between Slaney head and Fuchu point. The soundings in its approach are 15 fathoms at 12 miles distant and 5 fathoms at 3 to 5 miles from the head of the bay; the soundings are generally even with mud bottom, except off Slaney head.

The channel to the head of the bay is between Square island, 110 feet high and flat topped on the north, and Table point, a projecting rocky head on the south, which are 2½ miles apart, with a depth of 2¾ fathoms between, the deeper water being nearer the point than the islet. At 1 mile further in and eastward of Table point is a bar of 6 to 7 feet, ½ mile across.

A tongue of ground, having over it depths 3 to 6 feet less than on either side, extends about 4 miles seaward from the bar into the middle of the bay. The best anchorage is southward of this ground, with the western extreme of Table point bearing 176° and the point eastward of it about 109°, in 5 fathoms; or in shoaler water eastward of this position.

To proceed up the bay, from ½ mile northward of Table point, steer 91° for 2¼ miles, or to abreast an islet; round the northern point of this islet at the distance of 400 yards; the course then is about 146° for 2 miles, keeping 400 to 600 yards from the western shore and gradually closing that shore.

Fort head, 4 miles northward of Fuchu point, is a low table-land separated from the foot of the hills by a plain. Cocked hat, an islet 60 feet high, lies 800 yards off it. Between Fuchu point and Fort head is a bay which is shallow, but it has not been sounded. The land northward of Fuchu point is of singular formation and bears a remarkable resemblance to extensive fortifications. The western hill having this appearance is the largest, 530 feet high, and has a small conical projection above its regular surface; 2 other hills with flat summits are a short distance southeastward of the western hill.

The shore of the gulf from Fort head trends northeastward for 5 miles to Glacis point, the termination of the gentle slope from a hill 560 feet high. The sand hills on the intervening shore are conspicuous, and at the back is a double-topped hill 1,020 feet high, the southern summit of which, Proboscis peak, is curiously shaped. From Glacis point the land has a more easterly trend, sweeping round a large, open bay, the shores of which are rather low, with reefs off the points.

In the first bay eastward of Glacis point is a reef 1 mile in extent parallel to the shore, from which it is distant 1,200 yards. The soundings off the southern part of this bay at 4 or 5 miles from the shore are irregular, with depths of 6 to 8 fathoms, shallower ground of 4 fathoms extending 1 to 2 miles northeastward of Glacis point.

Schooner rock, about 56 degrees, 7$\frac{3}{10}$ miles, from Glacis point and off a small hill, is very conspicuous. At 5 miles northeastward of Schooner rock are the low McGowan cliffs 260 feet high.

Maxwell point, 5 miles northeastward of McGowan cliffs, is the western extreme of a hilly promontory 4 miles in extent, rising from the extensive plains of this vicinity in varying heights to 970 feet, while at about 12 miles inland a precipitous mountain chain of 2,000 to 3,000 feet elevation extends northeastward parallel to the coast for 30 miles.

Sandy head, 6 miles northeastward of Maxwell point, is a hill 440 feet high, the slopes of which are covered with sand. It is conspicuous from seaward of Bittern shallows.

Bittern shallows are banks of coarse sand, 22 miles in extent, fronting the shore westward and northwestward of Maxwell point, on which the sea breaks heavily during northwesterly and westerly winds. The most off-lying bank is at 308°, 9 miles, from Sandy head. The outer banks carry 12 to 16 feet water, several of the inner ones from 1 to 10 feet, and others 15 feet. There are generally channels between them having irregular depths of 5 to 10 fathoms in the outer channels and 3 to 6 fathoms in the inner; muddy bottom.

The outer bank, with 2 fathoms on it, has 14 fathoms close-to, while outside there is a uniform depth of 12 fathoms; mud. In other parts the banks are safe to approach to 10 fathoms; mud.

The lead should be used when in the vicinity of the shallows.

Vansittarts saddle, 13 miles northeastward of Maxwell point, is a group of hills on a projecting point of a great plain. The 2 southern hills on it are 160 feet high, and a large square tower stands 1 mile eastward of them. From the westward Vansittarts saddle makes like an island with 3 saddles.

Shallow rocky ground extends 1 mile off the saddle, and there are 2 rocky banks, ½ mile in extent, with a least depth of 3 feet on it, at 300°, 1½ miles, and the other of the same extent, with a least depth of 10 feet at 350°, $3\frac{3}{10}$ miles, from the saddle.

Tower hill, 30°, 9½ miles from Vansittarts saddle, is 420 feet high, and there is a conspicuous tower on its summit; a higher hill rises at its back. An islet lies off this point, and 2 miles northeastward of it rocky ground and some large reefs extend from the shore. The tail of this ground in 3 fathoms bears 356°, about 2 miles, from the islet.

Kaechu point, 33°, 8½ miles, from Tower hill islet, has a ruined tower on it, and the hills in its rear rise 700 feet and upward over the plain at the head of Kaechu bay. One of these hills is a sharp cone 850 feet high. A bank, 5 miles in length northeast and southwest, with patches of 10 and 12 feet on its outer part, lies about 5 miles offshore between Tower hill and Kaechu point. Tower hill, bearing 166°, leads westward, and Kaechu point, 86°, leads northward of the patches. A sandy bottom indicates proximity to the bank, there being soft mud in the fairway.

Many junks are usually at anchor northward of Kaechu point at about 3 miles offshore, the approach to Kaechu river being very shallow. Kaechu river, the entrance of which, at low water, is 3 miles north-northeastward of Kaechu point, becomes a torrent during rains.

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Kaechu fu or Kaiping fu, said to be 10 miles inland, in Lat. 40° 30′ N., Long. 122° 25′ E., is surrounded by a high wall, but its houses are low and ill built. This city, which is on the great road, was one of the chief commercial centers, and had a considerable trade, which has since the opening of Newchwang gravitated to that port.

A station of the Chinese Eastern Railway is situated on the right bank of the Kaechu river, almost midway between the city and the sea.

Directions for Liaotung gulf.—Steam vessels from the eastward round Liaotishan promontory at any convenient distance, and pass between Reef and Iron islands and the mainland. Courses are then steered to pass about 3 miles off North point and thence direct to Newchwang light-ship.

The ebb stream sets southwestward along the shore, but the flood stream follows the trend of the shore only so far as Fort head, when it turns northward; guard, therefore, in giving Bittern shallows a wide berth, against being drifted on Kaechu banks. As the position of a vessel southward of the Kaechu banks can not be determined by landmarks, the country northward being low, while the peaks eastward, 30 to 50 miles distant, can only be made out in clear weather, a general rule is that, having run the proper distance from Fort head without sighting the light-vessel, and being in 4 to 6 fathoms, run eastward, or, if the water still shoals, southeastward until the light-vessel is seen, but caution is necessary.

Liao ho, or Newchwang port, at the mouth of which lies Yingtze, a treaty port opened in 1861, drains the western half of the province of Shingking or Liaotung. It flows through a plain 70 miles in breadth and elevated only a few feet above the sea, and about its entrance the low land, covered with trees, is not visible at the distance of about 7 miles from deck, although it may be seen from aloft.

Newchwang city, which gives its name to this treaty port, is situated in the interior, on the road to Mukden, at 27 miles northeastward from Yingtze and 70 miles distant from Mukden, and is on a small tributary of the Hung ho or Mukden river, which latter falls into the Liao ho at 73 miles above the sea. There has been no trade there for 50 years, when it was removed to Tienchwangtai, 17 miles above Yingtze.

Mukden, the capital of the province of Liaotung, is by road nearly 100 miles from Yingtze or Newchwang port, whilst by water the distance is 140 miles. A Russian steam vessel ascended the Liao ho and its tributary, on which Mukden stands, to that city in 1901.

The Chinese Eastern Railway made a considerable curve to the westward of Mukden in order to avoid the imperial tombs of the ancestors of the present Manchu dynasty; it is believed that this has been altered.

There is a great highway road from Peking along the western side of Liaotung gulf, through Kin cho fu and Yingtze, to Newchwang and Mukden. Another great highway runs down the eastern side of the gulf, passing through Kaechu fu, Fucho, the head of port Adams, and then along the shore of the Yellow sea, through Ta ku san, to Korea.

Navigability.—Vessels of 17 feet draft can cross the bar of Liao ho during the summer at springs, but after the beginning of October, in consequence of the prevalence of northerly winds, which lower the water level in the gulf, it is advisable that vessels crossing the bar should not draw over 15 feet.

The depth over the bar during March, April, May, October, and November is, at high-water springs, with southerly winds 17 feet to 18 feet 6 inches, with northerly winds 15 to 17 feet; and at high-water neaps, with southerly winds 15 to 17 feet, with northerly winds 14 to 15 feet. The depth during June, July, August, and September is, at high-water springs, with southerly winds 19 to 22 feet, with northerly winds 16 to 18 feet; and at high-water neaps, with southerly winds 17 to 18 feet, with northerly winds 15 to 17 feet.

It is stated that at times 24 feet can be carried over the bar. The least water on the bar is 7 feet at low-water ordinary springs. Small junks ascend to Tieling (which has also been reached by a steam vessel), 205 miles from the sea, and good-sized junks to Tienchwangtai, 30 miles above the bar.

Ice.—The river is usually frozen up from December to March, inclusive, closing and opening a little earlier or later, according to the severity or mildness of the season. The thickness of the ice reached varies from 9 to 24 inches. If not actually blocked by ice at the end of November, the river is then dangerous for navigation owing to floating ice, and in the years 1898, 1899, and 1900 the ice in the river broke up on April 2, March 10, and March 23, respectively. Steam vessels enter the river about 2 days after the breaking up of the ice.

Vessels obliged to remain late in the season should moor close to the right bank, as the ice there is weaker and generally later in forming; vessels should not remain later than November 20. If wintering in the river, it is necessary to dig a dock in the river bank and secure the ship in it, to avoid the ice.

Pilots.—A pilot schooner, having competent licensed pilots for the Liaoho, always cruises near the light-vessel, except in bad weather, when she may take shelter. The schooner carries the pilot flag, yellow over green, horizontal, and the words "Licensed pilot," on the head of the mainsail. The pilots are under the control of the harbor master, by whose directions vessels are berthed, and whose permission is required before shifting berth.

Pilotage is not compulsory. Pilot charges are $3 per foot for steamers and $3.75 for sailing vessels.

Light-vessel.—A light-vessel, painted red, with Newchwang in white letters on each side and having three masts, the mainmast being surmounted by a black ball, moored off the entrance of the river in 28 feet of water, 13.7 miles, 238°, from Tower hill, exhibits at 35 feet above the sea a revolving white light every 30 seconds, visible 11 miles. When the light-vessel is in position, it will be in line with the channel over the bar.

When necessary to lower the light for trimming, a small white light is hoisted, and a blue light burned; and in order to indicate the direction in which the light-vessel is riding a white anchor light is exhibited, from sunset to sunrise, on the forestay at 6 feet above the rail.

If the light-vessel is driven from her proper position to one where she is of no use as a guide to shipping, the revolving light will not be shown, but a fixed red light will be exhibited at each end of the vessel; the ball will be struck, and until struck will be surmounted by a red flag.

A gun is fired when vessels are seen running into danger, and the course to be steered signaled by the international code.

This light-vessel is only in position from about April 1 to November 15, on account of the ice.

Fog signal.—In thick or foggy weather a steam fog horn is sounded from the light-vessel every 10 seconds.

Liaotung gulf—Shoals.—A shoal, with a depth of 4 fathoms over it, is situated at a distance of 10½ miles, 229°, from Newchwang light-vessel, in approximately Lat. 40° 27′ N., Long. 121° 49′ 30″ E.

A patch, with a depth of 4¼ fathoms over it, is situated 1 mile, 42°, from the above.

Wreck.—A sunken wreck lies in 6 fathoms with Newchwang light-vessel bearing 57°, distant 2$\frac{3}{10}$ miles.

Buoys.—Three buoys mark the channel over the bar, thus:

Entrance buoy, black with an inverted cone cage topmark, is moored in 16 feet on the southwestern extreme of the west bank and outer edge of the bar.

Middle buoy, black, with a diamond-shaped cage topmark, is moored in 8 feet inside the shoalest part of the bar and on the southeastern extreme of the west bank.

Inner or Fairway buoy, red and black horizontally striped, with a red spherical cage, moored in 12 feet, in the inner entrance to the channel across the bar and just within the shoal water.

From about November 1 to about April 10 these iron buoys are replaced by wooden spar buoys of similar colors and surmounted by black cages, fixed on bamboo poles. The positions of the buoys are subject to change.

Beacons—East spit beacon, a red spar surmounted with two red balls, 25 feet above high water, marks the western edge of East spit, a shoal extending southwestward from the dry bank of the river.

Whale back shoal, on the opposite side of the fairway, bears about 237° from this beacon.

Nodding Tommy beacon, a red spar, with a diamond-shaped topmark painted red, with a horizontal white band around its middle, 25 feet above high water, is on the left bank of the river and about 1 mile above East spit beacon.

Middle bank beacon, a red spar, with a red spherical cage topmark, 25 feet above high water, is on the left bank of the river, at low-water mark, about 2¼ miles above Nodding Tommy beacon.

Middle bank shoal, on the opposite side of the channel, bears about 240° from this beacon.

Flagstaff beacon, a spar 50 feet high, with a topmark of two diamond shapes, is on dry ground on the left bank of the river, and 1,400 yards northeastward of Middle bank beacon. The beacon is painted red from the ground to the lower diamond, which is white, and the remainder is red.

Fish house beacon, a black spar, 40 feet high, with a black diamond-shaped topmark, is situated on the right bank of the river, near high-water mark, and a short distance from the bend that leads to the harbor; it marks the channel crossing from the left to the right bank of the river when entering.

NOTE.—East spit, Nodding Tommy, and Middle bank beacons are removed in the latter part of November every year, on account of ice, and replaced as soon as practicable on the opening of navigation.

Fishing stakes.—While navigation is open the fishermen have three sets of stakes in the channel below East spit beacon; one set on the western side and two on the eastern. As these are good marks for the fairway channel it is customary on their removal previous to the setting of the ice to leave the outer stake of each set standing. Small baskets, painted red, are hung on the end stake of each row of fishing stakes on the starboard hand, and similar baskets, painted black, on the port hand, entering. They are not easily seen and may be some distance from the other stakes.

Tides and tidal streams.—It is high water, full and change, at Liao ho bar at 4h. 0m., springs rise 11½ feet, neaps 7½ feet; and at Yin koa (Yingtze anchorage) at 5h. 0m., springs rise 12 feet. The rise, especially at neaps, is much influenced by the wind, a southerly breeze causing a rise above the normal height, while northerly winds cause a fall below the same.

There is a tide gauge at the custom-house wharf which shows 2½ feet less water than there is on the bar.

It is said that in summer the tides are highest after noon, owing to the strong southerly winds during the day, and that in October and November the northerly winds then prevailing during the day blow the waters out of the gulf and river, hence the highest tides are in the morning, for the nights being calm give the water time to return to its usual height. But although such winds may in some degree affect the levels, these results are due to the ordinary day tides being the higher in summer, and the night tides in winter.

The highest tides occur about 2 days after full and change; the ordinary spring rise is about 11 feet, but occasionally the rise at neaps is only 5 feet. The morning tides (summer) are least to be depended on, as the rise is then comparatively small. There is usually a fall of 1 to 2 feet before the ebb stream begins on the surface; and a corresponding rise before the flood stream makes in. After a heavy northeasterly gale the water sometimes ceases to rise on the bar, and a reaction takes place some few days later, when an unusual rise occurs.

Outside the bar the flood stream sets north-northwestward at its commencement, and passing through north, finishes setting north-northeastward.

The tidal streams set obliquely across the bar, the flood about 5°, the ebb about 185°, at the rate of 2 to 4 knots.

The rate of the tidal streams in the river off Yingtze reaches more than 6 knots.

Anchorage may be made near the light-vessel or near the Entrance buoy.

Directions.—Caution is necessary in approaching the bar, especially when the weather is not clear, owing to the low land and the extent of the flats. The bar and river being subject to change, and the tidal streams rapid, local knowledge is desirable, and a pilot should be employed to enter the river.

Pass not more than 200 yards southeastward of Entrance buoy, and steer to leave Middle buoy 200 yards on the port hand. Thence pass close on either side of Fairway buoy, and keep in mid-channel using the outer fishing stakes as guides.

Near the bar the western bank is steep-to: the eastern bank shelves gradually.

Leave East spit, Nodding Tommy, and Middle bank beacons, 100 yards on the starboard hand. From Middle bank beacon steer 7°, and when abreast Flagstaff beacon steer to close the right bank above Fish House beacon. Then keep close along the right bank, returning to mid-channel when abreast the Chinese Railway station.

Then continue in mid-channel to the anchorage.

After passing Everlasting point speed should be reduced, especially if a strong flood stream is running, for the large number of junks and vessels at anchor or under way renders great caution necessary.

Yin Koa anchorage.—Saiilng vessels are moored in 2 lines off the native town. The fairway is between them.

The usual anchorage for steam vessels is northeastward of the custom-house, where both banks are steep-to, except in the rainy season (August and September) when a shoal of small extent, with a depth of about 9 feet over it, forms on the right bank. If proceeding with the stream, a vessel should pass the steamers before rounding to; a running moor is then unadvisable.

The holding ground off the foreign settlement is not very good. The best anchorage is just below the custom-house abreast of the Manchurian hotel. The ebb stream usually runs for 7 hours, and the flood for 5 hours.

Newchwang port (Yingtze) is situated 13 miles above the bar, and the name of the anchorage off it is Yin Koa. The foreign settlement is above the native town, and together they stretch for about 3 miles along the left bank, with a width of ½ to ¾ mile, but only a few feet above high-water mark. The Japanese have acquired a piece of land on the right bank above the Chinese Railway station for a concession, and the British have also obtained a piece of land for the same purpose, the land being contiguous to the Japanese concession. The high road to Newchwang proper and Mukden passes the back of the settlement. The custom-house is a large building with a flagstaff about 100 feet high. The number of foreign merchants is small and there is a resident medical practitioner.

The native town, the official name of which is Mukauying, has a main street fully 2 miles in length, the only noteworthy features of which are the large inclosures in which the native dealers carry on the business of storing and manufacturing the bean cake which is the staple trade of Yingtze. It is a dreary place; the muddy river winds through a plain of mud, without a single natural elevation to break the dismal monotony of the scene, and, indeed, except for a few weeks during summer, the region in which the port is situated is little more cheerful than a swamp.

Railways.—The Chinese railway runs from Yingtze to Tienchwang tai, and thence via Kincho fu to Shanhaikuan and Tientsin. A branch of the Chinese Eastern railway, known at Yingtze as the Russian railway, runs eastward from Yingtze to Tashihchiao, where it joins the main line from Port Dalny to Harbin, and thus connects with the Siberian railway. The Chinese Railway station, consisting of two sheds, with a jetty abreast them, is on the right bank of the river, bearing about 75° from Everlasting point.

The Russian Railway station is situated on the left bank at 48° about 2 miles above the custom-house.

Mud dock.—There is a mud dock at Yingtze available for vessels drawing 12 feet and less. Care must be taken that the sill is properly dug. In excavating a mud dock the sides should slope at an angle of not more than 45° with the bottom. The dock should be dug a few feet deeper than the dock sill, and should be of sufficient width for the bilge keels to pass clear. This extra width is also necessary on account of the sides breaking away during the winter frosts.

The dock should not be dug at a right angle to the bank of the river. It is considered that the process of docking would be less difficult if the angle was 70°.

The ship's draft should be reduced as much as possible, and the time of docking should be at slack water; that is, about 1½ hours after high water, when the water will have fallen 1 to 2 feet. At high water the stream off the entrance of the dock often has a rate of 4 knots, but the time of docking will depend on the strength of the current.

Storm signals are made from the signal station of the imperial maritime customs.

Time signal.—A time ball is dropped daily at the custom-house at 0h. 0m. 0s. mean time of the meridian of 120° E., corresponding to 16h. 0m. 0s. Greenwich mean time.

Coal.—About 17,000 tons of coal are usually in stock. There are 2 wharves, each 300 feet in length, having depths of 20 and 16 feet alongside them, respectively.

Trade.—The imports in 1906 amounted to $4,800,000 (approximately) and the exports to $5,700,000 (approximately). The imports consist of sugar, cotton, cotton goods, woolen goods, metals, matches, and kerosene. The exports consist of beans, bean oil, bean cake, castor oil, brown silk, hemp, tobacco, felt, indigo, furs, and hides.

The trade of Yingtze is very large; junks from all quarters visit it, and the foreign shipping is considerable. It is estimated that 700 to 900 junks, with beans, come down the river daily in October. The trade which formerly centered at Newchwang was, owing to the silting up of the higher parts of the river, removed to Tienchwangtai, and subsequently transferred to Yingtze, which, in addition to its proximity to the sea, has the advantage of a good depth of water.

The productions of the neighboring provinces are wheat and other grain, cotton, silk, indigo, tobacco, and they are rich in mineral resources, consisting of coal, gold, iron, silver, copper, and lead.

Supplies.—Beef, mutton, fish, fowls, eggs, and pheasants, and wild geese in season, are abundant. There are large stores of grain. White hemp rope, from 1 to 9 inch, can be purchased at from 5 to

6 cents per pound. Excepting in wages, Yingtze is perhaps the cheapest port in China, as provisions are so abundant and the demand is not large. European stores and clothing are usually imported from Shanghai, but there are ship chandleries established for the convenience of the foreign shipping.

Population.—The population is about 80,000.

Communication.—In winter the mails are now sent by rail from Port Arthur. The imperial postal system is being extended into the interior. There is telegraphic communication.

Winds.—The winds in the northeastern part of the gulf of Liaotung are very variable. Winds from south-southeast to south-southwest, either light with rain squalls, or blowing fresh, or a gale, with or without rain, may be expected, without warning, to suddenly shift to the northwestward or northward and blow hard for about twelve hours; these shifts are said to be common during summer, especially after August. Caution is therefore necessary, especially when in the vicinity of Bittern shallows. Sometimes these gales are of longer duration; in October sudden northerly gales, with snow and severe cold, last three days. During summer the prevailing winds are south-southwesterly, and winds between southeast and southwest are common. From November to March northerly and northeasterly winds prevail.

Climate.—The winter usually commences with a snowstorm; the weather then clears up and hard dry frost sets in, which continues with occasional falls of snow until the spring. The coldest months are December, January, and February, but the thermometer seldom falls below zero.

The hottest months are June, July, and August, and the greatest heat generally occurs in July and the first half of August. The temperature rarely exceeds 85°.

The climate is healthy, and serious sickness is very rare among the foreign residents.

Coast.—From the mouth of the Liao ho the coast trends in a general northwest direction for a distance of 45 miles to the mouth of the Siaoling ho. The coast has not been surveyed and caution should be observed in approaching it.

Kai chau banks.—These banks extend from the entrance of the Liao ho to the bar of the Taling ho, a distance of 25 miles. These shoals are very irregular, some dry, some covered, with passages of 3 and 4 fathoms among them.

Taling ho, about 25 miles westward of the Liao ho, has only been partially examined, and is apparently an insignificant stream, without sign of traffic. There are 6 feet of water on the bar.

Siauling ho, a small river, 17 miles westward of Taling ho, enters the gulf round some earth cliffs at 5 miles north-northeastward of

Gulf hill, its narrow bed taking a southerly course through the mud flats, the entrance of the channel being 4 miles eastward of the hill. It is only navigable by boats, even small junks having to lie off its mouth to discharge.

Kingcheu fu, the capital of this province, situated on the Siauling ho at about 10 miles within its entrance. The city stands on the great high road from Newchwang to Peking, and the railway from Tientsin to Newchwang passes through it; a line is also being extended from Koupangtze to Hsinminting. The city has a considerable trade in general goods.

Observation rock, lying 150°, 1 mile from Gulf hill, is in Lat. 40° 53′ 45″ N., Long. 121° 9′ 00″ E.

Tides and tidal streams.—It is high water, full and change, near Observation rock at 5h. 30m.; springs rise 10 feet, neaps 8¾ feet. The streams appear to run regularly northeastward and southwestward along the western shore of the gulf, turning at high and low water. They are very weak at neaps; at springs they are strong off the headlands.

Coast.—At the mouth of the Siauling ho the coast turns abruptly to the southward and westward, this point being the northern extreme of the Liaotung gulf.

Gulf hill, 5 miles south-southwestward of Siauling ho, is 551 feet high and conspicuous. The hill ranges continue north-northeastward for 30 miles, and eastward of them is a great plain. The mud dries 4 to 6 miles off shore, and on it are long lines of fishing stakes as far eastward as the Ta ling ho. There are only 2 fathoms at 2 miles from low-water mark, and 3 fathoms at 4 miles distant.

Kingchu bay, between Hulutau promontory and a point 6½ miles north-northeastward, is divided into two parts by a low, hilly point, on which is a conspicuous tower. The southern part is shallow, the mud drying out far between the point with the tower and the promontory, with a depth of 2 fathoms at about 2 miles from low-water line. The northern part of the bay is scarcely less shallow, there being 1 fathom at low water at 1 mile off shore, and 2 fathoms at 2 miles.

In the northern part of the bay, between two small heads, is the entrance to the Lau ho, a small river, 3 or 4 feet above low-water level. Between two small hills on the eastern side of its entrance is Takiatsung town, at the back of which, on a low, flat hill, is the Yuenshinmiau. A rock lies 1 mile southwestward of the town, and rocky ground extends 1 mile southeastward from it. This is the seaport of Kingcheu, and it is the only place in this part of the gulf to which large junks trade.

The water in Kingchu bay shoals gradually, and there is shelter for junks, except from southerly to southeasterly winds, at 1 or 2 miles off the town.

Strata island, off the northeastern point of Kingchu bay at 1 mile from the shore, is connected with it by a ridge of sand and shingle dry at low water. The island is very narrow, and with the rocks extending from it is 1 mile in length about north and south; it rises to four round hills, the highest being 253 feet high, and the stratification is laid bare along their western faces by the occurrence of land slips.

A halftide rock and a rock covered 6 feet lie, respectively, 1 mile eastward and ½ mile southeastward of the island. Each is at the extremity of foul ground, on which several rocks dry.

Hulutau promontory is joined with the line of steep hills by a narrow neck. Its southeastern extreme is a round headland or bluff, 404 feet high, close off which is a high pinnacle rock. The bluff has 5 fathoms close to, and the depth decreases to 4½ fathoms at 1 mile distant; at ½ mile eastward of the bluff is a small rock, 2 feet above high water, and a little northward of the rock, a sandy spit, on the outer part of which is a sand patch. A reef also lies off the northern side of the promontory.

Hunter point.—Situated 10 miles west-southwestward of Hulutau promontory is a rugged, steep range 820 feet high, the summit of which is broken by a ravine with a partially ruined tower on the outer part. Northward of this is a sandy bay fronting a plain, whence the shore trends eastward along a line of steep hills with some prominent peaks, on the western of which is a low tower. A few rocks border the shore which may be approached to about ½ mile in 3 to 4 fathoms. Landing could be effected on the shelving sandy beach northward of Hunter point.

The shore between Hunter point and North Ningyuen point, 3 miles southwestward, has three low hills on it, and off the northern side is a large reef.

From North Ningyuen point to South Ningyuen point, a distance of 9 miles, the Ningyuen flats extend 3 miles to Taohua, an island 720 feet high. There is a railway station at Ningyuen about 3 miles westward of Nort Ningyuen point.

Ningyuen flats extend off shore between the Ningyuen points, and would connect Taohwa with the main at low water, but a channel 800 yards wide and carrying 4 to 6 feet, runs close around the point of the flats, which project to within 1 mile of the island. The flats are of sand and mud generally and about 1 to 3 feet above low-water springs. Some patches of rock stand on the flats, of which the Cat and the Kittens on their southern part are the largest: the former is a black rock always above water, the latter a small patch of rocks which cover, 1 mile southward of the Cat.

Taohwa island is 3 miles in extent northeast and southwest; its outer part is distant 6 miles from the mainland, but it looks much farther, as the lowness of the land between the Ningyuen points gives the appearance of a deep bay. A valley divides the island, the southern hills rising 600 feet, and the highest of the northern over its eastern point, 720 feet. Its southern face is bold, in some places precipitous.

A ledge of rocks, on which some patches just dry at low water, and foul ground lie within 1½ miles of its eastern coast.

The northern point of Taohwa is a low projecting head, being only joined by a small neck of sand. Northeastward of this point is Table island, 80 feet high, the channel between, ½ mile wide, having a depth of 7 to 9 feet. Table island is flat with cliffs on all sides; off its northern end is Sail rock 60 feet high. These must not be approached within 1½ miles; the western coast of Taohwa can not be approached at all, as it dries out a long way at low water.

Anchorage.—Shelter from northeasterly winds might be obtained in the bay on the southern side of Taohwa off the valley. On approaching the latter avoid a 4 fathoms sounding at 154°, 1,400 yards from the center of the beach. Anchorage with shelter from southwesterly winds may be obtained in 4 to 5 fathoms northeastward of Taohwa.

Armytage reef, 45° distant, nearly 4½ miles from the eastern point of Taohwa, is 200 yards in extent, and nearly awash, with one or two rocks showing; rising out of 6 fathoms, the lead gives no warning.

Rocks.—A rock on which are 3 feet at low water and which sometimes breaks lies 16°, 1¾ miles, from Armytage reef: the bottom is sand and shells near the rock, off which soundings of 2 fathoms extend 200 yards. There is also a rock, awash at low water at about 1½ miles farther northeastward, and situated with Hunter point bearing 310°, distant 5½ miles. In calm weather there are tide ripples about these rocks, from which it may be inferred the ground is uneven.

Saddle island, bearing 118°, 5 miles, from South Ningyuen point, is a small saddle-shaped island, 120 feet high, steep on all sides except that a number of rocks project 600 yards from its southern point toward the mainland. There is a passage with uneven soundings of 3¾ to 6 fathoms, sand, between it and the small island of the same height lying 1,200 yards southwestward of Taohwa, which has steep sides with a 4-fathom channel between it and Taohwa.

Warren point.—Eight miles southwestward of South Ningyuen point there is a hill 170 feet high over Warren point, the northeastern part of which is a bluff with a staff on it. The southeastern part is low with some rocks off it; landing is practicable here at low water. Tiau yu tai village is on the inner side, and there are many small villages in this vicinity. Shoal water extends around the point, and the ground is foul and rocky for 1½ miles off. Warren point should not be approached within the depth of 5 fathoms.

The bay northward of Warren point dries out as far as Strong island, with the exception of the channel of the Ta ku ho, which winds through the mud flats from the southwest, and which is only accessible at low water from the southern side of the island by a channel midway between Warren point and Strong island with 7 to 9 feet at low water; to enter this channel, when the southern point of the island bears 75°, steer 255° and close the point northward of Warren hill to 200 yards. The water decreases to 9 feet off the point, after passing which and a sand spit on the western side of the passage, the course upstream, to where the junks anchor, is 311°, 1 mile. Very small junks get some distance farther toward the southwestern head of the bay.

Strong island is narrow, 1,600 yards long, and 200 feet high. It is covered with scrub, steep seaward, and very rocky all round. There is a temple on its eastern side. From 600 to 1,200 yards northeastward of its northern point is a reef, the outer rock of which does not cover, and two inner ones show only at low water. Eastward of the island the bottom is even.

Coast.—From Warren point to Sand point, a distance of 13 miles, the coast takes a southwesterly direction. The coast is shoal, with only 2 fathoms at 1 mile from the beach.

St. Ubes point from Sand point to 6 miles southwestward is very low and sandy, particularly under Boulder, Quarry, and Double hills, where it is fronted by a large flat, partially covered by the tide, and the resort of immense flocks of wild geese. Boulder hill, about 3 miles northward of Sand point, is 300 feet high, steep, and on its summit is a pile of granite bowlders having the appearance of a ruined tower. Quarry hill, at 1 mile southward of it, is smooth, round, 180 feet high, with a large granite quarry on its southern side. Double hill, 3 miles northward of Boulder hill, is about 250 feet high, and has a double summit, on the northern of which is a cluster of temples.

These isolated hills are excellent marks and look like islands.

A triangular spit, steep-to, fronts this shore, and at its outer point there is only 1 fathom at 1½ miles from the beach. A little southward of this a spit of 15 feet extends 2¾ miles from the beach. This spit may join Cruiser shallows.

Sand point, the southeastern corner of the sandy plain, is 10 feet above the sea, and there is a small joss house at its extreme. At $5\frac{3}{10}$ miles westward of it is a large, conspicuous, white building a little inshore, among trees, and off the point where it stands is a reef the outer part of which is 1,200 yards from the shore, with only 6 feet water inside the reef.

Cruiser shallows are extensive banks of coarse sand stretching nearly 8 miles southward of Sand point; their main portion lies from

3 miles southward to 6 miles southwestward from the point. There are patches of only 4 to 6 feet on the central parts of these shoals; they are ridges, one of which carries only 3 feet for several miles. Even in moderately fine weather a long line of breakers usually extends from the shore, caused by the tidal streams, which are very strong over the shallows, or by the swell.

Southward of the main bank is a channel, nearly 1½ miles wide, of 6 to 7 fathoms. Outside this and parallel to the shore are some narrow strips of sand, but their eastern and western limits are not well defined; their shoalest parts are 4½ fathoms, 210°, 9 miles, and 176°, 8 miles, from Sand point, and a patch of 2½ fathoms between these positions.

The lead is a good guide for clearing these banks, as a sandy bottom indicates their proximity, and the cleaner the sand the nearer the banks, which are very steep-to. Vessels should pass outside the banks in not less water than 13 fathoms, mud.

Tides and tidal streams.—It is high water, full and change, at 3 miles northeastward of Sand point at 4h. 50m.; springs rise 7 feet, neaps 5½ feet. The flood stream sets northward along the shore, the ebb southeastward; the streams turn earlier near the shore than in the offing.

Coast.—From Sand point to Rocky point, a distance of 47 miles, the coast trends in a west-southwesterly direction; shoal water up to 10 feet extends from 1 to 2 miles off shore; where it deepens quickly to 3 fathoms.

There are several towers inland on the great high road, which it is supposed they are intended to indicate when the country is covered with snow. Mount Fisher, a high double peak 1,800 feet high, is 12 miles inshore and at the southeastern extremity of the high ranges, which stretch westward. A very sharp peak of the same height as mount Fisher rises 4 miles northward of that mountain, and a hill, 900 feet high, with irregular slopes and a lower range in front, at 10 miles eastward of the sharp peak. Spur mountain, 9 miles north-northeastward of the sharp peak, is about 2,000 feet high, and has a long shoulder to the east, at the end of which is the spur.

Temple head, 120 feet high, is bordered from 400 to 600 yards by reefs of small bowlders. Its southern and eastern sides are cliffs, and on its summit is a joss house. Needle rock, 40 feet high, lies about 1 mile west-southwestward of the head, and rocky ground skirts the shore between the head and the point 2 miles westward of it, where there is a small joss house on a sand hill. Two large rocks, about 20 feet high, lie a little westward of Needle rock. Uneven ground of 2 to 3 fathoms stretches 1 mile south-southeastward of the head. The open bay northeastward of the head is shallow and rocky, and its shores are of sand drift, as is the shore between all the small headlands for 9 miles eastward.

Shoal point, about 6 miles west-southwest from Temple head, is the most prominent point of land near where the Great wall of China comes down to the beach, near a place called Ninghai.

Ninghai landing is generally possible in southwesterly winds on the beach under the lee of Shoal point, provided the boats can get in far enough, but there is a heavy surf on the beach during northeasterly winds, which subsides quickly after the wind goes.

Light.—A fixed white light, visible 10 miles, is exhibited from a white mast 38 feet high, on the outer bastion of the Great wall; this light is temporary.

Anchorage.—There is anchorage off Ninghai light mast, open from northeast, through south, to west. With the light mast bearing about 330° the depth is 4½ fathoms at 1½ miles, and 2 fathoms at ¼ mile, from the beach. In the depth of 4 fathoms the bottom is thick mud and good holding ground; closer in the bottom is sand, while in less than 2 fathoms it is rocky.

Tides.—It is high water, full and change, at Ninghai at 0h. 0m.; the rise is about 6 feet.

Northerly and easterly winds appear to raise the water, and southwesterly winds to lower it; a high level of the water appears to precede a northeasterly gale by about 18 hours, and for some days after the water may be abnormally low.

The Great wall of China now ends near the western shore of the gulf of Liaotung, in about Lat. 39° 58′ N., Long. 119° 49′ E. It originated at the beach, from which it ascended in broad terraces and massive flights of steps, and inclosed a piece of ground not far from the sea, named Ninghai, converting it into a fort, but the portion of the wall between the fort and the sea has been demolished, and the fort was being destroyed in 1902. The wall rises generally from 20 to 30 feet, in sections similar to the walls of Chinese cities, and with a thickness of 15 to 25 feet. From Ninghai the wall turns northwestward, and at about 1½ miles from the beach embraces Shanhaikuan city; then, striking over the highly cultivated plains at the foot of the mountains, it trends up one of the ridges and apparently along the higher portion of the chain, towers at regular intervals marking its course, after it has itself ceased to be visible. The mountains, some 2,000 feet high, approach to about 4½ miles from the beach, and though to a certain extent covered with vegetation, they are devoid of cultivation; the plain at their foot, however, which rises gradually from the sea to a height of about 450 feet up the sides of the hills, is in a high state of cultivation; wheat, millet, and maize are mainly grown, and it is dotted over with villages and trees.

Shanhaikuan is a walled city, 2 miles from the sea, on the western side of the Great wall. The land in the vicinity of the city is pasture and cultivated, and cattle and corn are abundant. There is a railway station of the Tientsin-Newchwang Railway at Shanhaikuan.

The great high road from Kincho to Peking, along which a great traffic exists, passes through Shanhaikuan. The road is described as being good, and fit for the passage of the country carts. It passes along the foot of the mountain ranges, though at times over some hills of no great elevation.

The sandy bay westward of Shoal point and between it and Creek point off Ninghai, a distance of about 7 miles, appears clear of rocks; the beach is steep, and the 5-fathom line of soundings is about 2 miles offshore. A cultivated plain extends from the mountains at 4 to 5 miles inland almost to the sea. Horses and cattle are numerous, and a large portion of the country is good pasture land.

Shoal.—A shoal, with 3 to 6 feet on it and steep-to, extends about 2 miles off Shoal point.

Chingwangtao bluff is a low rocky promontory, faced to seaward with cliffs 50 to 60 feet high and fringed with rocks, which dry for some distance out at low water. A short distance within these cliffs the land dips and rises again to rocky cliffs, 80 feet high, at the northwestern corner of the promontory, and to Haze hill at its northeastern corner. Haze hill is the highest point on the promontory, and is conical, sandy, and 104 feet high.

The interior of the promontory is mostly sand dunes on a foundation of clay. Chingwangtao is a treaty port. Fresh water may be obtained on the western side of the promontory from a spring, and on its northern side by digging anywhere near the magazine.

The country for about 1 mile within the promontory is a flat, sandy plain, with occasional sand dunes, but inside this it is very well cultivated and thickly inhabited.

The railway between Tientsin and Newchwang passes about 2 miles inland. The nearest station is Tangho, about 3 miles northwestward, and it is connected with the harbor by a railway, which runs on to the breakwater and pier.

Harbor information.—A draft of 25 feet may be carried to the wharf at Chingwangtao at high water, but the tides are irregular, depending largely on the wind. With westerly winds there are often no tides for several days. When the wind shifts to the eastward the tide will rise 4 or 5 feet in less than 2 hours.

The roadstead is exposed to winds from the west, south, and east, but good protection is afforded to vessels lying behind the breakwater, and the holding ground outside is mud and sand and quite good.

There are no pilots or tugs and no light-house dues. The pier belongs to the Engineering and Mining Company, and is only used by that company.

Stevedoring is compulsory, and the work is performed under contract by the Engineering and Mining Company. Vessels load and discharge at the wharf. There are no docking facilities.

There is a telegraph office with cable connections.

The current coin is the silver dollar, either Mexican or Chinese.

Bad weather occurs principally in the winter, with prevailing winds from the westward. During the greater part of the year the weather is fine, with prevailing easterly winds.

The port is seldom, if ever, closed by ice.

Chingwangtao is the winter port for Tientsin.

The importance of Chingwangtao as a port is steadily increasing. In 1905 the number of steamers entered was 217, with an aggregate tonnage of 233,963 tons.

In the same year the imports were valued at $14,309,010 and the exports at $2,324,420.

The outer breakwater is completed, and vessels drawing 20 feet can go alongside.

The harbor between the breakwater and pier has been dredged to a depth of 22 feet at low water as far as the Boxer rock.

A dolphin has been constructed on the rock situated near the head of the harbor.

Communication.—A steamer, which makes the passage in 48 hours, runs between Shanghai and Chingwangtao.

There are berths for 4 steamers alongside the breakwater and 2 alongside the pier.

Lights.—A fixed green light, visible 3 miles, is exhibited from the outer end of the pier, and a fixed red light from the outer end of the breakwater.

Light.—An intermittent white light, thus: Light 14 seconds, eclipse 2 seconds, light 2 seconds, eclipse 2 seconds, and visible 10 miles, is exhibited from a white mast 38 feet high and 87 feet above high water, near the southwestern extremity of Chingwangtao bluff.

Communication.—A steam mail service runs in winter weekly between Chifu and Chingwangtao, and during several winters the mails have been shipped and landed regularly, with very few exceptions.

Supplies are plentiful.

Coal.—The output (1902) from the Tang shan mines is about 18,000 tons weekly, of which some 7,000 tons are sent to Chingwangtao for shipment, and the rest is sold locally. There is usually at Chingwangtao a stock of some 50,000 tons.

River.—The river, which passes northward of the bluff and enters the sea westward of it, seems to be a good deal frequented by salt and fishing junks. These junks lie alongside or just inside a causeway extending from the northwestern point of the bluff to the main, but with openings in it for them to pass through. The bar constantly shifts and has about 6 inches of water on it at low water; inside the bar there is a depth of 2 to 3 feet. The fairway across the bar has been provisionally marked by beacons.

Shallow bay, between Creek point and Rocky point, 7 miles southwestward, is clear of rocks, and the shore is sufficiently steep to allow large boats to land easily. The depth is 2 fathoms at ½ mile, and 4½ fathoms at 2 miles offshore.

Tang ho.—This river, which enters Shallow bay at about 6 miles northeastward of Rocky point, is a mountain torrent and quite unnavigable. There is a quicksand at its eastern entrance.

Light.—A fixed white light, visible 4 miles, is exhibited from a quadrangular tower 20 feet high on Rocky point. This light is reported to be unreliable.

Coast.—From Rocky point the coast takes a sharp turn to the south-southwest for a distance of 55 miles to the mouth of the Ching ho. There are numerous outlying banks and shoals along the whole distance, and the coast should not be approached by deep-draft vessels closer than 4 miles.

In navigating along the shore between Shanhai kuan and Laumu ho keep in not less than 5 fathoms water.

Liusiakwang.—One and one-half miles west-northwestward of Rocky point is open from about east-northeast to southwest; depth is 4½ fathoms at 2½ miles, and 2 fathoms at ¼ mile from the sandy beach.

The passage to the beach near Liusiakwang is between two sand banks, the one extending from Rocky point, the other from the mouth of the Taicho ho. The depth in the passage is 2 fathoms at ¾ mile, and 4½ fathoms at 2¼ miles from the shore; the beach is steep, and the landing good.

The land about Liusiakwang is cultivated to the foot of the mountains, which are 4 to 5 miles inland. Horses and bullocks are numerous.

Taicho ho enters the sea at about 1½ miles westward of Liusiakwang; it is said to rise in the low hills at the back of Shallow bay, and to run first in a westerly direction, then southward and southeastward. The bar at the river entrance has only 1½ feet on it at low water. Between the bar and Liusiakwang the soundings are shoal.

There is a railway station at Peitai ho, about 3¾ miles inland from the entrance of the Taicho ho; the country between the station and the hills near the sea is sometimes inundated after heavy rains.

Tides.—It is high water, full and change, at the entrance of the Taicho ho at 0h. 15m.; springs rise about 6 feet.

Yang ho.—About 2 miles southward of the Taicho ho, the entrance of which is very shallow, with a depth of 1 foot over the bar; a few junks pass a short distance up it at high water, but the greater number discharge their cargo just within the entrance, whence it is carried into the interior in carts. The beach is sand and mud.

The anchorage off the Yang is open seaward from about northeast to southwest. The water is shoal, the depth being 4½ fathoms at about 4 miles and 2 fathoms at about 1½ miles from the river's mouth.

The land near the sea southward of the Yang ho is unfertile, and apparently partially covered at high tides. The line of sand hills along the beach is at the distance of 300 yards from the water's edge, and extends inward in places about 1 mile.

Tides.—It is high water, full and change, on the Yang ho bar at 0h. 15m.; springs rise 6 feet.

Pu ho, which enters the sea about 9 miles south of the Yang ho, though shallow and of no great length, is used at high water by junks, which discharge their cargoes on the bank at about 1 mile within the entrance. The bar dries at low water. The rise and fall is about 6 feet.

Shati point is the southern end of a ridge of sand hills 30 or 40 feet high, forming the shore and extending south-southwestward in a straight line from Pu ho, a distance 17 miles.

Laumu ho.—The entrance of this river is 10 miles southerly of Shati point. There are 4 fathoms at 1¾ miles south-southeastward of the entrance, and 2¾ fathoms at 1½ miles, but the anchorage here is open from seaward between north-northeast and south-southwest. A small island, covered with grass, lies on the outer end of a sand bank, which dries at low water, in the entrance. At the entrance there is a narrow bar with 3 feet over it at low water. Within the bar there is a depth of 10 to 12 feet nearly to the western point and 10 feet up to a village or rather a series of storehouses, about 1 mile up the river on the right bank, where junks discharge. A breastwork affords defense at this spot. Some junks ascend higher, and there is said to be a fort to protect the upper anchorage.

A stream of fresh water runs from this river into the sea, discoloring it to some distance.

Tides.—It is high water, full and change, at the entrance of the Laumu ho at 1h. 30m.; springs rise 5 feet.

Hsinshai kau, about 2 miles southwestward of the Laumu ho, is a barred creek, into which junks sometimes run for shelter. The country on either side of the creek is an extensive swamp, more or less covered by the tide. To the southwest large plains of sand and hard mud exist for 6 or 8 miles inland and present a desolate appearance. The shore has a sandy beach.

The mirage on this shore is very deceptive, giving an appearance of water to the dry sand and distorting the objects considerably, small huts sometimes appearing, when first seen, to be large forts.

Ching ho, the entrance to which is about 13 miles southwestward of Hsin shai kau, is some 50 miles in length. There are 4½ fathoms at 2½ miles southeastward and 2 fathoms at 1 mile eastward of the entrance (which is marked by beacons), but the anchorage off the entrance is open to seaward.

The passage into the river is through a break in the extensive banks which here skirt the shore for many miles and across a bar on which there are only 2½ feet at low water. Inside the bar there is good anchorage for large number of small vessels. The numerous fishing stakes in this river are a very good guide to the channel, as they are always in the deepest water. The river has two other entrances; one from the eastward through a creek which dries at half-tide, the other from the westward, which is nearly as deep as the main entrance. Mud flats, covered at high water, extend for some miles in all directions. A sandy beach stretches nearly 5 miles southwestward of the main entrance. There is no good landing in the river before arriving near Tachingho village on the left bank at about 5 miles within the entrance, where large quantities of grain are landed and stored; any vessel that can cross the bar can reach the village. Junks ascend the river in considerable numbers, but apparently not farther than the village.

Westward of Ching ho is a mud flat, formed into an island by the main and western branches of that river. A few miles westward of the western entrance a ridge of sand, which is covered at high water springs, joins the Shaluitien banks.

Tides.—It is high water, full and change, at Ching ho entrance at 1h. 20m.; springs rise about 6½ feet.

Coast.—The coast from the entrance to the Ching ho trends in a westerly direction for a distance of about 52 miles to the entrance of the Pehtang ho, the Ching ho being the southwestern limit of the Liaotung gulf.

Extensive shoal banks extend to the southward off this stretch of coast, which have not been surveyed and should not be approached within 13 miles or inside of 6 fathoms.

Shaliutien island is situated 16 miles southwestward of the entrance to the Ching ho at the southeastern extreme of the Shaliutien banks. The island is low, covered with long grass, and, unlike the banks, which are of dark river sand, is of white sea sand.

Light.—A group flashing white light, showing groups of 2 flashes every 20 seconds and visible 12 miles, is exhibited from an octagonal tower painted black 51 feet above high water on the southern part of Shaliutien island. This light is discontinued from January 1 to March 1.

Shoals.—Soundings of 2 fathoms have been obtained at about 15 miles eastward of Shaliutien island, in approximately Lat. 38° 57′ 30″ N., Long. 118° 50′ 30″ E.; and a patch of 3 fathoms lies at about 69° 10½ miles from Shaliutien light-house.

Shaliutien banks.—The eastern edge of this extensive bank extends from the entrance to the Ching ho to the northeast point of Shaliutien island, and thence from the southern side of the island it trends westerly, a little northerly for a distance of about 19 miles, where it recedes toward the coast to the entrance of the Ching ho.

The banks, some of which dry at low water, must be approached only with great caution.

There are passages, used by small junks, between these banks, with innumerable shoals, over which nets are spread, but there appears to be no open channel between them and the mainland; there is a junk passage in some part, available only at high water.

The western edge is skirted by irregular off-lying patches, and has many openings, one of which 1 mile in breadth, runs in 2 miles eastward. The lead gives good warning off the southwestern part of the banks, after shoaling to 8 fathoms, but not off the island, where it is steep-to in 13 fathoms. Good anchorage with smooth water was found off their western end in Lat. 39° 02′ N., sheltered from northeasterly gales, to which the anchorage off the Pei ho is open.

Tides and tidal streams.—It is high water, full and change, off the western part of the Shaliutien banks at 2h. 50m.; springs rise 10 feet, neaps 8 feet. Near the banks the flood sets westnorthwestward along their edge with a rate of 4¼ knots at springs, and the ebb southeastward with a rate of 3 knots; on the western side of the banks the flood sets northward, but its rate is not so great.

A strong northwesterly wind drives the water out of the head of the gulf of Pechili, reducing the depth a little; southerly winds raise the water.

Haeyetse 3 miles eastward of Chiang ho can only be reached from the southwestward at high tide, as it dries out 2 miles from the shore at low water.

The country is desolate, barren, and uncultivated; a desert of dried mud, sand, and salt, with here and there a stunted shrub. The inhabitants have little subsistence but fish, and have to go 12 miles for drinking water. Small whirlwinds are frequent and raise the dust in clouds. There are 3 other villages to the eastward, but they have never been approached by foreign vessels, as they lie inside the Shaliutien banks. There is a harbor at the Chang cha entrance (the second creek eastward of Chiang ho), but nothing is known as to its approach.

Chiang kau is at the entrance and on the left bank of the Chiang ho, a small creek, in which junks unload.

Pehtang ho, the entrance to which is 15 miles southwestward of the Chiang ho, has the village of Pehtang located on its southern side at the entrance. The river for about 5 miles above the village has a general depth of about 3½ fathoms at low water in the middle of the channel, with banks on both sides which are fairly steep-to.

There is a railway station at Pehtang.

The bar, situated about 5 miles below the entrance, is mud, as are the banks on either side of the entrance, which dry out 4½ miles at low tides, the outer part of the northern bank being of hard sand. Three white beacons mark the bar; the first has a ball as topmark, the second a large ball with a small ball over it, the third a large ball. These beacons are left on the starboard hand entering.

Tides.—It is high water, full and change, outside Pehtang bar at 3h. 0m.; springs rise 9 feet, neap 7½ feet.

Directions.—There is open anchorage off the Pehtang, and the depth is 4 fathoms at 10 miles off shore.

The Taku light-vessel is a good guide.

To enter the river, approach the bar from the southeastward, and cross it leaving the beacons on the starboard hand; the edges of the bank being generally uncovered, or showing by a smooth or ripple. It is recommended to cross the bar at high water, and if the banks above the bar do not show, to wait a little inside before proceeding up the channel, which is 200 to 250 yards wide between the banks.

Coast.—At the entrance to the Pehtang ho the coast turns abruptly to the southward to the mouth of the Pei ho, a distance of 8 miles.

The shore from the entrance of the Pehtang ho is low and fronted by an extensive flat for 8 miles southward to the entrance of the Pei ho. The ground for 1 or 2 miles northward of Taku, and also southward from Pehtang, is covered with tombs, but the remaining part is a swamp, or low ground broken by numerous ditches, and near Pehtang an arm of the sea stretches 4 to 5 miles inland, across which the road from Pehtang to Sinho runs on a causeway, with ditches on both sides of it.

The Pei ho, or Peking river, is the great highway to Peking, the capital of China, and the important city and treaty port Tientsin stands on this river at its junction with the Grand canal, of which it is the northern terminus. More correctly, it is the Yuliang ho which joins the Pei ho at Tientsin, which river rises near where the Yellow river enters the great plain, about 300 miles southwestward, the Grand canal joining the Yuliang ho about 150 miles southward.

The Pei ho, running through an alluvial country, is very tortuous, the distance from the entrance at Taku to Tientsin being 30 miles by land and 50 miles by water. It has the characteristics of similar rivers, being deep off the steep banks and shallow off the shelving ones.

Tientsin (Heavenly ferry) stands at the junction of the Yu liang ho and Pei ho, which meet east and west, their combined waters flowing directly southward, the former having run a course of 300 miles, the latter 220 miles.

The Pei ho is known at Tientsin as the Hai ho (Ocean river); at Taku it is known as the Nan ho (South river), in contradistinction to the Pehtang ho, commonly known as the Pe ho (North river). Between Tientsin and Tungcho it is known as the Ta ho and the Pei ho.

Extensive mud flats dry for about 5 miles in a southeasterly direction from the mouth of the Pei ho. The river at its mouth is 200 yards wide at low water, with a depth of 16 feet in the middle of the channel. It runs through the mud flats in a 148° direction for 1½ miles, shoaling to 6 feet, when it turns to 103°, becoming deeper for a short distance, and then gradually shoaling to the bar. The river continues 103° in direction for 2 miles, and then curves to 126°, becoming shallow and drying in patches at the lowest tides. This very shoal portion—the bar—extends about 1 mile to the outer edge of the flats, seaward of which the water gradually deepens.

Navigability.—The ordinary depth at high-water springs may be taken as 11 feet. The height of the water is much influenced by the direction and force of the winds, not only local, but also at the entrance of the gulf of Pe chili; a strong northerly wind there reduces the depth on the bar, while an easterly wind considerably augments it; at neaps there is at times as little as, or less than, 6 feet at high water.

Vessels of 10 feet draft touch the ground constantly unless they have sufficient speed to cover the distance between Taku and Tientsin at high water.

Seagoing steamers with lengths up to 270 feet and drafts up to 10½ feet reached the bund at Tientsin, the passage up the river taking about 7 to 8 hours.

For some of the larger steamers navigation downstream was not without difficulty, and sometimes occupied over 24 hours.

Three cuttings for straightening the course of the river have already been completed, and the distance from Taku to Tientsin thereby reduced from 56 miles to 47 miles. In addition much widening and deepening of the river has been effected, especially off the wharves at Tientsin, where steamers up to 275 feet in length can swing round at their moorings.

Two more cuttings have yet to be made, and when they are completed the distance from Taku to Tientsin will be only 36½ miles.

Ice.—The ice usually begins to form about December 1, and the river from Tientsin to Tung ku is on an average frozen over about December 5.

The river is usually stationary, with ice from Tung ku to outside the bar from the middle of December to the latter part of February, and the thickness of the ice is ordinarily 18 inches, though it often reaches 24 inches.

The ice when it breaks up parts with a great rush, and in 48 hours it all disappears during a continuous ebb stream; the ice when breaking up is not sufficiently heavy to damage a vessel riding at anchor in the stream.

Light-vessel.—A light-vessel, painted red, with Taku on her sides, and having one mast surmounted by a black ball, moored in the outer anchorage in 19 feet off Taku bar, exhibits at 35 feet above the water a revolving white light every half minute, and visible 11 miles.

This light-vessel is only in position from the opening of the river early in March to November 30, on account of ice. To show the direction in which the light-vessel is riding, a white riding light is exhibited from sunset to sunrise from the forestay, at 6 feet above the rail.

If the light-vessel be driven from her position to one where she is of no use as a guide to shipping, the revolving white light will not be exhibited, but a fixed red light will be shown at each end of the vessel; the ball will be struck, and until struck will be surmounted by a red flag.

Fog signal.—In foggy weather a gong is sounded at one minute intervals.

During the winter months when the light-vessel is withdrawn, her position is marked by a black spar buoy carrying a red flag.

Bar light-boat, painted red with one mast surmounted by a ball, is moored on the northern side of the channel across the bar, abreast of South Bank black buoy. It exhibits a fixed red light, visible 4 miles.

Spit light-boat, painted red, with one mast surmounted by a ball, marks the southwestern extreme of North bank, at about 2 miles westward of the Bar light-boat. It exhibits two fixed red lights, placed vertically, and visible 1 mile.

Light.—An intermittent white light, elevated 30 feet above high water, is exhibited from a beacon erected on the site of the North fort.

Lights.—Two poles, painted white and with black triangular top marks, have been erected, on the western shore of the river entrance, which when in line lead through the channel between the Bar and Spit light-boats.

At night a fixed red light, elevated 44 feet above the ground, is shown from the rear beacon, and a fixed white light, elevated 20 feet above the ground, from the rear beacon.

These beacons are moved as the channel alters.

Buoys.—The passage over the Taku bar is marked by four buoys which are subject to alternation in position. No. 1, Fairway buoy, red and black horizontally striped with a black spherical cage, is outside the bar in 2½ feet of water and marks the best approach to the bar; No. 2, Black or South buoy, is on the southern side of the channel to mark a bend; No. 3, North bank spit buoy, red, is on the southern edge of the north bank spit; No. 4, Inner buoy, red, is on the southern edge of the north bank.

The buoys are iron buoys, and are removed during the winter months.

The Fairway buoy is moored about 1 mile outside the crest of the bar, and in a position where the depth at high water is approximately 3 feet more than on the bar.

The buoys are replaced by black spar buoys during the winter.

Pilots.—There are one or more pilots on board the pilot schooner, which is usually moored at about 1½ miles east-northeastward of the light-vessel, except during winter when navigation is closed. There is seldom any difficulty in obtaining a pilot, but it is advisable to give notice in advance.

Anchorage.—Vessels anchor off the Taku bar according to their draft; there is a depth of 24 feet at about 8½ miles from the river entrance.

The holding ground at this anchorage is excellent. A heavy gale brings in an unpleasant sea, yet with good ground tackling and plenty of cable out it is considered that a sailing vessel ought to ride out a summer gale; in winter, when the weather is very severe, ships can not anchor there at all, owing to the ice.

Sometimes vessels anchor in their own draft of water, for the mud is very soft, and with the wind from seaward the level of the sea rises, whilst with offshore winds which diminish the depth of water the sea is always smooth.

The anchorage, called officially the Outer anchorage, extends from the customs' junks to 3 miles seaward of the bar.

The native divers are very skillful and have recovered boxes of specie from a depth of 25 feet. As gales sometimes come on in a few minutes without the slightest warning, boats alongside are liable to be stove or damaged.

Telegraph cables cross the river at its entrance and anchorage is prohibited in their vicinity.

Cables are also laid from Taku to Chifu and Shanghai.

Insects.—Vessels at the Outer anchorage, although so far from the land, are, in summer, infested with enormous numbers of mosquitoes, dragon flies, beetles, and other kinds of flying insects, whenever the wind is off shore. These insects are exceptionally bad in the river during summer.

Tides and tidal streams.—It is high water, full and change, at the Pei ho bar at about 3h. 30m.; springs rise 10½ feet, neaps 9½ to 10½ feet, and the neap range is 4½ to 5 feet.

The range of tide at the bar is greater than that in the entrance of the river in the proportion of 1: 15 to 1: 00. The time of tide also differs; high water occurs in the river entrance 10 minutes later than on the bar and low water 1h. 30m. later.

At the anchorage outside the bar the flood stream sets northwest and the ebb stream southeast, with an average rate of ¾ knot. On the flats the flood stream sets northward and the ebb stream south-southeastward, with an average rate of 1 knot. In the channel the streams set toward or away from the river mouth when the flats are uncovered, but, as they cover, the streams have a tendency to run across them parallel with the coast. During the ebb, after the inner flats uncover, the rate of the stream in the channel near the river mouth is 2 to 3 knots, which gradually decreases seaward.

The stream at the entrance of the river runs up for 1 to 3 hours after high water and down for ¾ hour to 2¼ hours after low water.

Tidal signals.—The following signals are made from a flagstaff erected on the site of the North fort to indicate the depth of water in the raked channel (Ferguson channel) and not on the old bar. A vessel employed sounding is anchored on the bar when the water is high enough for vessels to enter, and she signals the actual depth by a private code to the station.

The signals to indicate the depth of water on the bar are made by means of balls by day and white lights by night, as follows:

Depth on bar.	At the northern yardarm.	At the southern yardarm.
8 feet	1 ball	
9 feet	1 ball	1 ball.
10 feet	1 ball	2 balls, horizontal.
11 feet	1 ball	2 balls, vertical.
12 feet	2 balls, horizontal	
13 feet	2 balls, horizontal	1 ball.
14 feet	2 balls, horizontal	2 balls, horizontal.
15 feet	2 balls, horizontal	2 balls, vertical.
16 feet		2 balls, vertical.

At the gaff end: A ball or light indicates an additional 6 inches to the depth.

At the masthead: A ball or light indicates rising tide.

Signals.—The signal for a steam tug of the Taku Tug and Lighter Company, when required by a vessel at the anchorage outside the bar, is International Code flag N.

The following signals are in common use in the Pei ho:

At anchor:

Anchor light and 3 white lights at peak or ensign staff.

Aground:

Anchor light and 2 white lights vertical at peak or ensign staff. with, while getting afloat, the usual steam lights.

Aground, blocking the channel, so as to render passing dangerous:

Anchor light, 2 white lights vertical at peak, and 1 light at each masthead; that on the after mast red.

Steam vessels going with the tidal stream have the right of way and show a square blue flag at the fore; those acknowledging the right hoist a white pennant with a red ball.

Two steamers flying the blue flag are not to attempt to pass.

A square red flag at the fore means " use great caution in passing."

Directions.—The entrance to Pei ho is subject to change, and no directions for its navigation can be given; local pilots must be employed.

From Taku to Tientsin, owing to its winding course, great care is necessary; some of the bends are very sharp.

There are convenient warping posts at the worst places, so that check lines can be made fast; twin-screw vessels do not require these aids.

As in some parts of the river the channel is very narrow and barely of sufficient width to allow two vessels to pass each other, it has become customary for that vessel which is proceeding against the tidal stream to run her bow aground so as to make way for the other, which may be done anywhere without danger.

When at anchor in the river during the night a sharp lookout must be kept for junks, which generally drift down the river broadside on; some of them are so large and strongly built that a collision with one of them would probably cause serious damage.

The number of junks in the river is greatest from the end of May to the beginning of September.

Vessels anchoring in the river must anchor as close to the bank as possible and buoy the anchors. No foreign vessel is allowed to anchor in any narrow part of the river, nor in the bends. Persons infringing these regulations are liable to fine.

The land at the entrance of the Pei ho is low and flat. The cavaliers (tech.) of the old forts and the telegraph office at Taku are the most conspicuous objects from seaward. The forts were being razed in 1902, but it is understood that the cavaliers are not to be destroyed.

The mud flats fronting the entrance are of the most treacherous character, and unfit for landing on when uncovered. Northward of the old North fort is a good beach of sand and shells extending 1 or 2 miles and accessible to boats at high water, and the mud flat off it is less soft than in the immediate vicinity of the river.

Taku village is 2 miles up on the right bank of the river at the second bend; from it there is a road to Tientsin.

Tung ku is on the left bank about 2 miles above Taku and 2½ miles northwestward of Tung ku, and 1 mile off the river is Sin ho, from which a road leads to Tientsin and another to Pe tang, 6 miles distant. There is a railway station of the Peking-Newchwang Railway at Tung ku. A considerable line of wharves and godowns exists along the river here, with the railway close behind them, and the railway company is building a large wharf just above Tung ku. The wharf of the Chinese Mining and Engineering Company, at 1¼ miles, nearly, above Tung ku, is about 500 feet in length, and vessels drawing 12 feet lying alongside just touch the mud at low water; there is a derrick on the wharf to facilitate landing heavy goods and a branch railway connects to the Tung ku-Tientsin line.

The banks of Pei ho are flat and sterile near the sea, but higher up all the country is beautifully cultivated. In some parts of its course the river is raised above the surrounding country.

Several pilots live at Taku.

A regular service of tugs runs from Taku to the railway station at Tung ku.

Docks.—The docks belonging to the Taku Tug and Lighter Company are, respectively, 304 and 303 feet long on blocks, 72 feet and 84 feet wide at high-water level, 31 and 40 feet wide at sill level, and have a depth of 10½ feet over their sills.

They are built of wood and closes with mud.

The shears have a lifting power of 20 tons.

Repairs.—At the Chinese Government dock at Taku there are machine shops of all kinds, and shears to lift 35 tons. The Taku Tug and Lighter Company also have machine shops and shears to lift about 10 tons. Large repairs to machinery and boilers can be executed.

The Taku Tug and Lighter Company have a large salving plant.

Tientsin, a treaty port, is 51 miles up the river from the fairway buoy and at the confluence of the Yu liang ho or Grand canal with the Pei ho. It is the seaport of Peking and the largest city in the north of China; the river at Tientsin is 200 feet wide; above the city it soon becomes shallow.

The city proper is inclosed within a four-sided crenulated wall, nearly square and 3 miles in extent, with towers at the four angles. Toward the river, suburbs more extensive than the city itself extend 2 miles down along both banks of the river.

Cholera, typhus, and smallpox, especially the last, are prevalent, and carry off numerous victims every year. Tientsin has excellent water communication by rivers and canals.

The population is about 750,000.

The foreign concession is about 3½ miles below the city and extends on both banks of the river; it has a fine bund, and a jetty at which steam vessels can unload. About ¼ mile below the British concession is a rampart and tidal ditch generally known as "Sang kolins sin's Folly," within which are situated all the foreign concessions, custom's establishment, church, race course, burial ground, and the Elgin joss house, a small temple where the treaty of 1858 was signed.

The French consulate is supposed to be in approximately Lat. 39° 7′ N., Long. 117° 14′ E.

Tides.—It is high water, full and change, about 7h. 0m., but it varies very considerably. The average rise and fall is 3 to 4 feet, and the greatest range 6 feet. When the snows melt, the river is said to rise 2 or 3 feet higher; the water sometimes remains at its high level for 3 or 4 hours. The tide takes 4 to 6 hours to rise and 6 to 8 hours to fall.

The flood stream has a rate of about 1 knot, and it continues for an hour after high water; the ebb has a rate of 2 knots, and it runs until 1 to 2 hours after low water. At times when it has been blowing from the northward there is scarcely any rise of tide, and the stream then always makes down.

Storm signals are made from the storm-signal station of the imperial maritime customs.

Trade.—In 1905 the value of the imports amounted to $64,351,600, and of the exports, including reexports, to $13,302,280.

In the same year 12 sailing vessels and 795 steamers, with an aggregate tonnage of 885,518 tons, entered the port.

The chief foreign articles of import are cotton goods, cambrics, woolens, silk, opium, metals, needles, kerosene oil, railway materials, and matches. The native imports are hemp, paper, teas, sugar, silk, seaweed, beche de mer, camphor, and ginger. The chief exports are bristles, coal, dates, ground nuts and ground-nut oil, hair, medicines, skin clothing, goatskin rugs, skins, and wool.

Coal mines are being worked at Kaiping, situated on the railway at about 46 miles northeastward of Tung ku, and also at Tang shan, about 8 miles nearer Tung ku. From the new mines at Linsi an enormous output is expected. The coal is of good quality, and may be obtained at Taku.

Communication.—A railway runs from Peking to Newchwang, via Tientsin and Tung ku; there is also a railway from Peking to Cheng tingfu, which is completed to Hankow.

Couriers formerly left Tientsin with the overland mail every Tuesday, Thursday, and Saturday, after the Pei ho was closed by ice, for Chinkiang; mails now go from Tientsin to Ching wang tao by rail and thence by steamer.

There is telegraphic communication.

Supplies.—At Tientsin and along the river bullocks, sheep, and poultry can be obtained; vegetables are rather scarce. Water is supplied at Tientsin by the waterworks company.

Climate.—The climate off the bar of the river is both agreeable and healthy during summer, the sea breezes which then prevail tempering the heat; at Tientsin the summer heat rises to 90° and at times to 105°, but it does not appear to be accompanied by those debilitating effects which are so frequent in the Tropics, and the prevalent diseases, typhus, cholera, and smallpox, are rather attributable to want of sanitary precaution than to climatic influence. In winter the thermometer ranges from 25° to 5°, the most severe cold occurring, generally, early in February, when the temperature falls sometimes to 5° below zero, and the temperature generally rises to 65° before the end of March.

Tientsin to Peking.—From the junction of the Wen ho at 2 miles above Tientsin, where the river is 150 feet wide, it continues fairly uniform in breadth to Tungcho, which is 90 miles above Tientsin by the river, and 63 miles by road.

The influence of the tide is felt for 7 to 15 miles above Tientsin, according to the level of the river, and its rate in the upper part of the river is 2 to 3 knots. Boats of shallow draft can ascend to Tungcho, but the river in some places is only 15 inches deep, and boats drawing 2 feet have had to be dragged over the shallows.

There is a narrow tracking path along the banks, and according to the number of trackers employed, the force of wind, and the rate of the current, a boat may ascend to Tungcho in 3 to 5 days. A broad, paved avenue, 11 miles long and in very bad repair, leads from Tungcho to the capital.

A canal, the Yuliang ho, 12 miles in length, also connects the Pei ho at Tungcho with the capital, but it is only adapted for flat-bottomed boats, for the locks are inclined planes of masonry up which the boats are hove by capstans.

Peking.—The residences of the British and other foreign ambassadors are within the city of Peking (i. e., northern capital), which is situated in a sandy plain about 13 miles westward of the Pei ho at Tungcho.

The Newchwang-Tientsin-Peking Railway runs from Tientsin to Feng tai, and thence to Lukia chiao, connecting with the trunk line Hankow. From Feng tai a branch line runs 5 miles to Machia pu, which is about 2 miles southward of the central southern gate of Peking. An electric tramway connects Machia pu and the gate of the city. The population of Peking is estimated at 700,000 (1908).

CHAPTER III.

PEI HO TO YANGTZE RIVER ENTRANCE.

Gulf of Pe chili.—The great inland sea within Pe chili strait, known to the Chinese as the North sea, has two branches, the southern part called the gulf of Pe chili, which extends about 150 miles east and west, and the Liaotung gulf, which extends a similar distance northeastward.

The gulf of Pe chili lies on the northern and northeastern sides of Shantung and Chihli provinces. Several rivers flow into it, chief among which is the Hwang ho or Yellow river. At its head is the entrance of the Pei ho, on which river stands Peking, the capital of the Empire, and also the city and treaty port of Tientsin.

Liaotung gulf is the continuation of the gulf northeastward, lying between two mountain chains in Liaotung province. The Liao ho, on which river stands the treaty port of Newchwang, empties into the head of the gulf.

Soundings.—The general depth in the middle of the gulf of Pe chili is 10 to 14 fathoms; this depth is maintained to near the Shaliutien banks, but it decreases toward the southwestern edge of the gulf, from which shallow water extends many miles.

Climate.—It appears that the climate of these gulfs is temperate and agreeable in summer, and severe and stormy in winter, which is of 4 months' duration. The land is then covered with snow, snowstorms occurring as late as the end of February, and showers until the middle of March, when the winter season breaks up and the snow melts.

A dry season then commences, with scarcely any rain during the summer, and light variable winds prevail. About the middle of September the weather becomes unsettled, with westerly winds and occasional short gales.

In October the temperature of the water falls 20°, and sharp frosts occur at night; at the beginning of November snow falls in the northern part of Liaotung gulf, and at the end of that month, at the entrance of the Pei ho, snow accompanies northerly and easterly gales, which also bring severe frosts.

The southern shore of Pe chili gulf from Tengchau head trends west-southwestward for about 53 miles to Laichau; it is low, lying under a mountain range, the summits of which are 10 to 15 miles inland. The shore is generally even, but some points project considerably, and should be approached with caution in bad or thick weather, particularly in northerly or northwesterly gales, when the rate and direction of the current is uncertain.

Eastward of Laichau the mountains turn abruptly southward, but the shore turns westward and forms a shallow bight, 45 miles across. Thence the shore continues northwestward for about 100 miles to 25 miles from the Pei ho. This shore, the margin of the great plain of China, is low, sandy, and almost a desert.

The coast from the Pei ho trends south-southwestward, and between the Pei ho and Chi ho, a distance of 25 miles, the soundings are shoal, and there are only 4 fathoms at 7 or 8 miles from the land; the sands dry out 1½ miles at low water and are hard. About 11 miles southward of the Pei ho is the Yen ho, or Salt river, which is sometimes dry. The country inside is a plain of sand, apparently dry, except a few places which are inundated at the top of the tide, and is almost entirely uncultivated. For 5 or 6 miles southward of the Pei ho the edges of the soft mud flats are covered with fishing stakes.

There are several small fishing villages along the coast between the Pei ho and the Chi ho.

Chi ho, into which no fresh-water stream enters, is a salt-water creek; a narrow tortuous channel, having a bar outside, which dries about 2 feet. The creek runs up about 3 miles to some villages, is 60 to 70 yards wide, and carries 15 to 16 feet water inside the entrance, which is 200 yards wide.

The anchorage off this river is very shoal, there being only 2 fathoms at 7 miles from the entrance. The passage over the bar must not be attempted without buoying it; and it is not safe for a boat to come down from Chikau on the ebb after dark, unless the banks are uncovered sufficiently to define the channel, which is very winding.

Chikau is a small village on the southern entrance point of Chi ho, inhabited by fishermen. Junks of 5 to 20 tons bring millet from Tientsin in exchange for fish. The surrounding country is totally uncultivated, and at Chikau its appearance is uninviting and desolate.

Tides.—It is high water, full and change, off the Chi ho at 4h. 0m.; springs rise 10½ feet, neaps 8 feet. At 20 miles offshore it is high water half an hour earlier. Near the shore the tidal streams are weak. In the Chi ho the ebb stream ran 9 hours.

The coast between Chi ho and Tasan ho, a distance of 24 miles, is a somewhat higher sandy plain, and the beach is steep at high water; at low tide it dries about 1 mile out.

Tako ho (Tasan ho).—Close off its eastern entrance point is a low island on the western point of which is a village, and on the eastern the Siaushinmiau (Little spirit temple) amongst some trees and sand hills. The channel from the river entrance takes a northerly direction through the outside banks, the bar, on which there is a depth of 1½ to 2 feet water, being at its outer part. The river is the boundary between Chihli and Shantung provinces.

Mirage.—This shore in hazy weather presents a very peculiar appearance from seaward, all objects being ridiculously magnified, The small villages start out of the mist like huge towns, and men loom like towers, whilst the shores vanish on either hand in long, finely tapering points.

The coast of the gulf from Tasan ho to Litsin ho, a distance of 41 miles, is low, extremely irregular in outline, broken by large openings, and apparently devoid of vegetation, with sand banks extending in places 3 or 4 miles off it.

Shoal.—A shoal spot with 2¼ fathoms on it lies about 14 miles northeastward of the entrance to the Litsin ho in Lat. 38° 00′ N., Long. 118° 51′ E. Also 9 miles eastward of the entrance is another shoal, with 2¼ fathoms, in Lat. 37° 55′ N., Long. 118° 46′ E.

Hwang ho, or Yellow river, flows through the midst of a densely peopled and highly cultivated country, but offers no facilities for navigation throughout a great extent of its course.

From the cities of Hwaiking and Kaifung to the sea, a distance of 350 miles, this great river has no permanent bed, but alternately changes its direction through the great plain passing northward or southward of the Shantung mountains. It has for ages been kept within vast embankments to prevent the periodic desolation by its inundations.

In 1642 the city of Kaifung was submerged 20 feet, and 200,000 persons are said to have perished. In 1854 the river flowed into the Yellow sea in Lat. 34° N., but in that year it diverted near Kaifungfu into a northern bed it occupied 550 years before, and joining the Tatsing ho, discharged into the gulf of Pe chili. In 1887 a terrible inundation occurred by the river bank giving way, and towns and villages were swept away.

Litsin ho, or Tatsing ho, the present outlet of the Yellow river, has its entrance in Lat. 37° 53′ N., Long. 118° 36′ E. Tsinanfu, the capital of Shantung, stands about 4 miles southward of the river at about 110 miles from the sea, but little is known concerning it.

Tatsin ho signifies Great Pure (or clear) river; its waters are now laden with yellow mud or clay, caused by the irruption of the Yellow river into its bed.

The entrance of the river is known as Litsinkau to the junk men, who also term the river Litsin (Profitable ferry), after a town of that name, about 42 miles from the entrance. On the northern entrance point, round which the river takes a very acute bend, is Miaushingpu, consisting of a few mud hovels, and the only habitable spot for many miles in every direction. Above, for nearly 40 miles, is a desert of mud covered with reeds, dry in winter, but inundated in summer.

There appears to be no permanent navigable channel fit for steam vessels into the river.

Anchorage.—Taipingwan, the anchorage outside the bar, in 2 or 3 fathoms, is where the larger trading junks, which can not enter the river, remain to discharge and receive their cargoes by river boats. Smaller junks lie within the entrance points of the river, eastward of the village and on the same side.

Tiemunkwan, or Iron Gate pass, the highest point to which the junks ascend and trade, is about 15 miles above the village at the entrance of the river, and, though only a village, like others in the neighborhood, of mud-built houses, it appears to be a very important place. It is not a center of trade, but consists chiefly of hongs, to which traders from the different towns within reach come to transact business; during winter, when the river is closed by ice, it is said to be nearly deserted.

Although called a port, Tiemunkwan is only used by small Pei ho and river junks.

Coast.—The shore of the gulf south-southeastward of Litsin ho, or Yellow river, to Laichau bight is extremely low and skirted by sand banks; the water off it is so shallow that at the distance of 3 miles the depth is only 6 feet, and it is less than 4 fathoms within 10 miles.

Laichau bight is about 45 miles across eastward to Sandy point; its eastern part near Quoin island (Fuyungtau) has depths of 2 to 4½ fathoms, but otherwise there is a depth of only 1 fathom at 5 miles from its low shore, which is not visible from navigable water. Several rivers flow into the bight; their positions are not accurately known, nor are they approachable except by the smallest craft at high water. Laichau fu, or Edible-plant city, a place having a coasting trade, is said to be in Lat. 37° 9′ N., Long. 119° 48′ E., and to stand near the eastern side of the mouth of the Kiau ho, which enters the bight at about 12 miles southwestward of Sandy point; a little eastward of the river's mouth are high craggy cliffs and a fort. The city is not visible from the summits of Fuyungtau nor Sansan saddle.

Quoin island (Fuyungtau), 3 miles southwestward from Sandy point, is 200 feet high, and resembles a wedge; a small rock, just above high water, lies 800 yards westward of it. There is a depth of only 7 feet water between the island and the main land.

Laichau bank, of hard sand, very shoal, and having several dry patches, extends 8½ miles northwestward from Sansan saddle. It is nearly 4 miles broad at its base, and 1 to 1½ miles at its outer part; its western side and its northern extreme are very steep; at other parts it is shelving. Sansan saddle, bearing 120°, leads in 7 and 8 fathoms close northeastward of its northern extreme, and Sharp peak of mount Elias open westward of Fuyungtau 151° leads westward. The bight southwestward of the bank is Taiping wan (Great Peace bay); the bottom is soft mud.

Sandy point lies 237° 5¾ miles from Sansan saddle and on the summit of a small hill, 100 feet high, a little eastward of the point, is the conspicuous red temple. Sandy point is very shelving, and dries out in spits and patches for 2 miles. There appears to be the entrance of a small river close southeastward of the point, with a depth of 7 feet in its approach; junks anchor off it. There is a small village near the entrance, and northward of a large sand hill, abreast which is a dry sand bank 800 yards off shore.

Sansan saddle rises at a projecting point of the sandy plain, 57° 5¾ miles from Sandy point; it is a double-topped hill, 195 feet high, but a sharp-topped shoulder on the east gives it the appearance of 3 hills. Its northern point is a cliff, which tapers southwestward for 1 mile to a rocky point and island, round which is the outlet of two small streams and where there is a village of considerable size at the base of the hill.

A small remarkable hill, 100 feet high, rises abruptly from the plain at 3 miles southwestward of Sansan saddle. Inland to the southward are several isolated hills, the twin-topped hill nearest the sea and 4½ miles from it, being conspicuous. Mount Elias range is 20 miles southward of the saddle, and a ridge trends north-northwestward for 13 miles from its northern summit, 2,190 feet high. There are several lower ranges nearer the sea, all of which are said to be covered with an impenetrable jungle.

The large village at the base of the saddle has a fishing population.

Coast.—From Sansan saddle the coast curves in to the northeastward forming a bight called Lunkau bay and then recurves to the westward forming a low, narrow peninsula 4½ miles long stretching westward from the mainland, the extremity of which, called Chimatau promontory, lies 21 miles northeastward from Sansan saddle.

Chimatau promontory.—The promontory is 350 feet high, with cliffs on its sea faces; off its western point is a semicircular reef, the heads of which uncover, with 10 and 11 fathoms close to; its southern point, where there is a village at the base of the hills, is low. The northern side of the isthmus is a steep beach, but there are some straggling rocks off the cliffs.

Light.—A fixed white light, visible 10 miles, is exhibited from a brick tower on the western of the three peaks of Chimatau promontory. This light is maintained by local fishermen and junk people, and it is unreliable.

Lunkau bay is on the southern side of Chimatau, and at about 4¾ miles from the southern point of the promontory is a small river, with Lunkau village on its banks by the shore. Junks anchor off the river, which is approached by a narrow channel through the banks outside, carrying 9 feet water, which decreases to 6 feet at 400 yards off the entrance. The banks off the isthmus on the northern shore of the bay dry out 1½ miles, and a somewhat less distance southward of the river.

Two points with small reefs off them lie 14¼ and 17¼ miles, respectively, southwestward of Chimatau; on the latter point is a sand hill and a shrine. The soundings off the coast are even and gradual, with a sandy bottom near the shore. There is said to be a rock with 2 fathoms on it at nearly midway between Chimatau and Sansan saddle, about 5¼ miles offshore, in Lat. 37° 33′ N., Long. 120° 05′ E., but the position is doubtful.

Yeh shan and Keu shan peaks, 2,065 and 2,515 feet high, respectively, are the summits of a mountain range to the southwestward; a ridge trends northwestward from the latter, terminating in a steep, sharp peak 1,420 feet high, 3 miles inland.

Sang tau is about 1 mile across, 30 feet high, and has a village and temple on its southeastern point; it is surrounded by rugged reefs, the points of which dry out 400 to 600 yards, with uneven ground outside them. A detached reef lies 1,400 yards southeastward of its northeastern point, between which and the reef the depth is not more than 3 fathoms. A large reef, on which is Sand islet, lies ½ mile northwestward of the island, with shoal water and very uneven ground extending northeastward and northwestward of it; at 1,200 yards seaward of the islet there are iregular soundings of 3½ to 8 fathoms. A rock, on which a vessel drawing 9 feet struck, lies approximately 2 miles northward of Sand islet; and a reef of rocks lies about 2 miles 294° from Sand islet; the sea breaks on both the rock and reef in heavy weather. As the positions of these shoals are doubtful and as other rocks may exist, Sang tau and the rocks off it should be given a wide berth.

The passage inside Sang tau has been only partially examined. The deepest water is 6 fathoms at one-third from the shore, but from 1 to 3 miles westward of Hwang point is a bank of rock, gravel, and sand, and this may be connected with Sang tau, from which it lies 1½ to 2½ miles southwestward.

Knob hill, 120 feet high, lies 12 miles east-northeastward of Chimatau promontory.

Davenport point, 8 miles east-northeastward from Knob hill, is low and rocky and a large village on it is marked by a conspicuous tree on an earthwork. At the back of the village is a low hill with a large artificial mound on it. The point is bordered by reefs covered at high water, their outer part being 1,200 yards northwestward of the point.

Dark bluff, a hill 600 feet high, situated 3 miles south-southeastward of the point, is conspicuous on easterly bearings.

The low coast commences 1 mile westward of Davenport point near the mouth of a small stream, Lwankiakau, where a few junks are generally at anchor.

Tengchau head lies 7 miles east-northeastward from Davenport point. The coast between is a sandy strip at the foot of a range of hills. The bay inside of the Tengchau bank appears to be clear.

Tengchau bank, apparently of sand and rock, extends west-northwestward 7 miles from Tengchau head, with a general depth of 2 to 4 fathoms on it, and several small knolls and ridges of shallow water. The outer knoll of 2 fathoms lies 289°, 7 miles, from Tengchau head. This knoll and a 3-fathom patch $1\frac{3}{10}$ miles southward of it are the shoal heads of the outer part of the bank, on which are depths of $3\frac{1}{2}$ to $4\frac{3}{4}$ fathoms; a series of shoaler patches, on which are several knolls of 1 to 6 feet, thence extend about 5 miles to Tengchau head.

Tengchaufu, nearly a mile south-southeastward of Tengchau head, was the port opened by the treaty of Tientsin, but, being unfitted for trade, Chifu was substituted.

The city is surrounded by rather a formidable-looking wall. An opening in its sea face forms the entrance to a small basin, in which a fleet of junks lies closely packed and sheltered from all winds; its entrance is so shallow that a very moderate sea breaks across it. The population of the city is estimated at 130,000. No supplies can be obtained here.

Pechili strait, the eastern entrance to the gulf of Pechili, lies between Tenchau head in the Shantung province on the south and Laiotishan promontory in the Kwantung peninsula on the north, and is 55 miles in width.

Miao tao (Pagoda islands) consist of a chain of islands, 15 in number exclusive of small rocks, extend for a distance of 35 miles from Tengchau head to about 21 miles from the southwestern extremity of Liaotishan promontory, and separate the Yellow sea from the Gulf of Pechili.

Channels.—There are numerous channels between the islands in which there is plenty of water, and any one may be selected as circumstances may dictate.

Miao tao strait, between the southern part of the group and the mainland, may be used for navigation; but there are much better and more direct channels northward of Chang shan island. The fairway of the strait between the shoals is about 2¼ miles in width.

Chang shan, or Long island, the southern point of which lies 9°, 3$\frac{6}{10}$ miles, from Tengchau head, is the largest of the Miao tao group, 7 miles in length north-northwest and south-southeast, and divided into two parts by a narrow isthmus of shingle nearly 1 mile in length. Its eastern and northern sides are bold, cliffy, and steep-to, and Cairn hill, the highest in the northern part of the island, is 570 feet high. The southern part of Chang shan is also hilly, its southern and middle hills being each about 490 feet high.

Chang shan tail, a sandy spit, extends upward of ½ mile southward from Spit point, the southern end of the island, and a shoal with 1½ fathoms over it, continues southward to nearly 1¼ miles from the point. The tail shows at low water; there is a tidal overfall on it which extends, like breakers, for a considerable distance across the strait, far southward of the shoal.

Tahi shan, or Great Black island, is about 2¾ miles westward of the northern part of Chang shan; its western point is a cliffy bluff, 600 feet high. A reef, with some rocks on it, extends about 1¾ miles southeastward of the island.

Miao tao, or Temple island, between the southern part of Chang shan and Tahi shan, is 310 feet high; there is a village on the island.

Observation, Ellis, and Siauhi shan islands lie between the northern part of Chang shan and Tahi shan.

A rock, 25 feet high, lies 340° about 1,400 yards from Ellis island. It is shoal around, and should not be approached within 600 yards; at 14°, 800 yards, from it is a rock of small extent, with a depth of 3½ fathoms over it. The flood stream sets east-southeastward past the 25-foot rock and the ebb westward; tide rips extend between the rock and Ellis island, and the passage between them is unsafe.

Hope sound, on the western and northwestern sides of Miao tao, is sheltered on the east by that island and Chang shan and on the west and southwest by Tahi shan and the reef extending southeastward.

Hope sound is a summer anchorage, when even boat work is seldom interrupted, but it is a thoroughly bad anchorage in winter, when northerly winds are prevalent. All the sound, except Charybdis harbor, is shoal where well protected from the northward and unprotected where it is deep. A part of the eastgoing stream through Miao tao strait turns northward through the sound, and in northerly winds causes vessels to lie broadside to the swell.

In winter such a heavy sea sets in, with northerly gales, that when riding with the swell on the beam the rolling is so great as to endanger masts and boats. Snow storms occur, with northerly winds having a force of 10 to 11; barometer, 30-60; thermometer, 16°, and the cold piercing.

Charybdis harbor, between the western side of the northern part of Chang shan and Observation island, is 1 mile in length, north and south, and about 800 yards wide; its eastern side is fringed by a shoal, which commencing at the northwestern point of Chang shan, extends southward and surrounds Miao tao island. In the southern part of the harbor this shoal extends westward 700 yards, the western extreme being marked by some rocks above water.

Observation island is 600 yards long, north and south, about 300 yards wide, and 280 feet high; a sandy spit extends 500 yards southward from its southern point. Rocks above water extend 400 yards northeastward from the northeastern part of the island; these rocks stand on a shoal flat which skirts the eastern side of the island at a distance of 400 yards, and continues 200 yards southward of Spit point, its southern end.

The anchorage space in the harbor is thus narrowed by the shoals, and it has a depth of 4 to 7 fathoms, stiff mud.

The harbor may be entered from either northward or southward; it affords secure anchorage at all seasons, being protected by the surrounding islands and reefs, and although northerly winds cause a ground swell it is not enough to inconvenience a large vessel. It is advisable to moor, as vessels are generally tide rode.

Landing can always be effected. The natives of the village on the eastern side of the harbor are civil, but no supplies, except rock oysters and a few fish, are obtainable.

Tides and tidal streams.—It is high water, full and change, in Hope sound, at 10h. 24m.; springs rise 6 feet, but the rise is much affected by strong winds. At Depot bay, at the southern end of Miao tao, it is high water at 10h. 35m., springs rise 6 feet. In Charybdis harbor it is high water, full and change, at 10h. 30m.; springs rise 9 feet. The tidal stream sets northward in Hope sound and Charybdis harbor during the flood and southward during the ebb. For some distance eastward of Miao tao strait the flood stream sets westward, and the ebb eastward; but within the strait, a few miles westward of Teng chau, the flood sets eastward and the ebb westward.

Directions—Miao tao strait and Hope sound.—From the eastward to clear Chang shan tail and shoal, keep Island head, the eastern point of Chang shan, open eastward of Spit point, bearing about 0°, until the northern point of Mia tao is open of Ship point, about 328°, when gradually alter course for the anchorage on the southern side of Chang shan. Or for Hope sound, after rounding the tail, steer about 291° until Ellis island is open westward of Club point, about 7°; then keep that mark on, leave Club point on the starboard hand, and anchor with Cairn hill 52°, and the temple on Miao tao

94°, in 4 to 6 fathoms, or near this position. There is good anchorage southward of the eastern end of Siauhi shan, as close in as the draft will admit. The bottom is stiff mud and good holding ground.

To pass through the strait after clearing Chang shan tail, make a direct course between the shoals; to clear Teng chau bank, which is bordered by water 10 to 16 fathoms deep, keep Teng chau head southward of 120° until the western end of Ta hi shan bears eastward of 356°.

Tachu shan, or Great Bamboo island, the eastern of the Miao tao group, is 480 feet high, of a barren appearance, and is bordered by a white shingly beach which appears steep-to. There is a village on its southeastern side, and cattle have been seen on the island.

Siauchu shan, or Little Bamboo island, 2¾ miles westward of Tachau shan, is 840 feet high. A reef extends 200 to 400 yards from its northwestern side, and a shoal with 2 to 3 fathoms on it about 1,000 yards from its southern point, and a rock with 2⅓ fathoms over it lies 168°, distant 580 yards from southern point of island.

Shamo tao lies 300°, about 4 miles from Tachu shan, is narrow, 600 yards in length, and 165 feet high. A spit, with 3 to 6 feet water over it, extends about ½ mile southward of the island.

Sometimes the tidal streams appear to set toward the southern sides of these islands.

Hauki island lies 335° 4¼ miles from the northwestern point of Chang shan, is 310 feet high, and reefs extend some little distance from its northern and eastern ends.

Light.—A revolving white light every 30 seconds and visible 24 miles is exhibited from a black circular tower 46 feet high and 328 feet above high water, located on the summit of Hauki island. The keeper's dwelling is white. This light is discontinued during the winter.

Fog signal.—In answer to a vessel's fog signal two guns are fired with an interval of 2 minutes between them; and if the vessel's underway fog signal continues to be heard the firing is repeated after an interval of 10 minutes.

Chang shan channel (or Pagoda gate), between Chang shan and Hauki, is the best passage through these islands.

Kao shan channel, between Hauki and Kao shan, is clear and deep. Caution should be observed in this passage in thick weather, as the stream on one occasion was reported to have set southeastward at a rate of 5½ knots.

Hesper rock lies 26° 5 miles from Shamo tao, is about 30 yards long east and west, and 10 yards wide. It dries 4 feet at low water springs and is scarcely covered at neaps; at the highest tides there is only a break or a ripple over it.

Caution is necessary in the vicinity of this rock, especially at high water.

Tsenleangshu rock, lying with the center of Shamo tau in line with Siauchu shan summit bearing 165°, Tokitau peak 292° 3 miles, and 272° $3\frac{6}{10}$ miles from Hesper rock, is about 30 yards in extent, with about 12 feet on it at low water.

Close around Tsenleangshu there are depths of 8 fathoms, rocky ground, and farther off it 10 to 13 fathoms over hard mud.

Toki tao, about 10 miles northward of Chang shan, has a conspicuous peak 613 feet high. Its southern coast appears clear. A small rock off its southeastern point and Mochang shi islet off the western part of its southern coast are steep-to. Chief bay, on the southern side of Toki, has anchorage in 6 to 9 fathoms, protected from the northward and westward, but quite open to the southward.

There are villages on the southern and northeastern sides of the island, which is well cultivated, and fresh provisions and water may be procured.

Chinchumun, or Pearl gate, is the passage northward of Shamo tao and southward of Hesper rock, Tsenleangshu, and Toki tao.

South Toki channel, between Toki tao and Kao shan, appears clear.

Kao shan, or Quoin island, nearly 5 miles west-southwestward of Toki tao, is 650 feet high and wedge-shaped, with its highest part to the southward.

North Toki channel, between Toki and Ta kin, is not recommended on account of Fisherman rock.

Fisherman rock, lying 54° $2\frac{6}{10}$ miles from the northern point of Toki tao and with the western side of Shamo in line with the peak of Siauchu shan, is awash at low-water springs. There is generally a ripple over it when the streams are running and the sea is smooth, but when the streams are slack or with any sea no signs of it are usually visible.

To pass southward of the rock do not bring the northern point of Toki southward of 266° until its eastern point bears 176°, and to pass northward of it do not bring the southwestern end of Takin northward of 346° until Kao shan opens southwestward of Toki.

Takin tao, lying 26° 5¾ miles from Toki tao, is 590 feet high. Siaukin tao lies 1¼ miles northward of it, and the Takin tao channel, which separates them, is apparently clear and deep.

Hwangching tao, the two northern islands of the group, lie about 2 miles east-northeastward of Siaukin tao, and the Siaukin tao channel between appears to be clear and deep. North Hwangching tao is 440 feet high, and its peak is in Lat. 38° 23′ 37″ N., Long. 120° 55′ 00″ E. A rock, which dries 6 feet, lies ¾ mile off the northeastern coast of the island.

North and South Hwangching are separated by a channel running east and west, about 1,400 yards in width. In the eastern part of the channel, at about 800 yards northeastward of the northeastern point of South Hwangching and in the fairway, is a small rock which dries 6 feet at low water. A reef, with a flat rock on it, extends ¼ mile northwestward of the northwestern point of South Hwangching.

Liaotishan channel, 23 miles wide, between North Hwangching tao and Liaotishan promontory, is, so far as is known, clear and deep.

Low point.—Returning to the coast at Tengchau head the coast trends eastward to Low point for a distance of 8 miles; there is a small bay in this stretch with deep water near the coast; a conspicuous hill 250 feet high marks Low point.

Sloping point.—From Low point to Sloping point the coast trends southeastward for a distance of about 13 miles. There is a rock awash 3½ miles southeastward of Low Point and about 1 mile from the shore.

At Sloping point the coast takes a turn to the southward for 8 miles and then eastward for about 8 miles along a low sandy beach to Chifu bluff.

Chifu cape is the eastern extreme of a mountainous peninsula connected with the mainland by a low neck of land of considerable extent. This peninsula is 5 miles long, east-southeast and west-northwest, and trends in a narrow ridge parallel to the coast; it is high and steep. Chifu peak, at the center of the ridge, is 980 feet high, and has a double top.

Sentry rock, 200 yards southeastward of Chifu cape, is also bold; although the water for some distance off this rock is often discolored there is no shoal.

Three or four detached rocks lie within about 600 yards of the northern coast of the peninsula, but they are all above water.

Chifu bluff is a precipitous cliff immediately under Chifu peak. Northwest rock, 400 yards northward of the peninsula near its western end, is high.

Village bay lies between Chifu cape and Tower point. The bay has a general depth of 16 feet, but shoal water extends from its western side.

Tower point lies 211° 3 miles from Chifu cape. It rises quickly to its summit, Tower hill, 170 feet high, where there is a fort and the signal station.

Rock and beacon.—About 400 feet off the northwestern part of Tower hill is a rock, which dries 2 feet at low water, on which is an iron rod surmounted by a black spherical cage.

Middle point lies 117° 1¾ miles from Tower point. It is the extreme of a small headland jutting out about 400 yards from the coast.

Knob point lies 135° 1¼ miles from Middle point. It is a small promontory 110 feet high; the land within it rises, and at 238° 1$\frac{8}{10}$ miles from the point is a mountain 1,300 feet high, which is the end of a ridge extending thence westward 4 to 5 miles.

Chifu or Yentai harbor, a treaty port, is in a bight of the coast between Knob point and Chifu cape within the Kungtung islands, which are a natural breakwater, and shelter the anchorages from northward and eastward.

Anchorage.—Chifu harbor, although affording ample depth of water for all ships, is exposed to strong northwesterly and northerly gales, which are experienced in winter, but the holding ground in all parts of the anchorage is very good, and it is unusual for a vessel to drag.

Vessels usually anchor southwestward of the Kungtung islands, at a distance off the point according to draft of water and the season of the year. There is good summer anchorage in about 4 fathoms with Knob and Middle points in line at about ½ mile northeastward of Tower point.

Small vessels anchor in Village bay, and also in Chifu bay off the settlement, where there is a depth of 10 to 20 feet, but the former is preferable, the latter being only safe in summer. There is good winter anchorage for small craft off the village inside Chifu cape.

Northerly gales send in a heavy swell and render the anchorage off Chifu in some degree insecure, and in winter the sea is so heavy in these gales that all loading and unloading is entirely suspended. In summer it appears to be perfectly safe to lie off Chifu, for hundreds of junks arrive from the southward in the beginning of that season and leave at the end of it, remaining at anchor the whole time.

In vessels of deep draft the depth of water over Kungtung flat must be considered.

Prohibited anchorage.—Anchorage is prohibited, on account of telegraph cables, southward of a line from Tower point to Southeast island.

Two white pole beacons with triangular topmarks in line indicate the direction, 44°, of the cables for ½ mile off shore, whence the cables run between 92° and 100°.

Tides.—It is high water, full and change, in Chifu harbor at 10h. 34m.; springs rise about 8 feet, neaps 6½ feet. The tidal streams are strong in the offing, the south-going stream running during the rising tide and the north-going during the falling tide.

Caution.—The water is said to be considerably lower in winter than in summer and sometimes to fall as much as 5 feet below the level to which the soundings are reduced after a strong northwesterly winter gale.

Directions.—The mountain, 1,300 feet high, at 238° $1\frac{8}{10}$ miles from Knob point, bearing 248°, leads about 1,200 yards southward of the Kungtung islands. Keep this bearing on to clear the East sand spit, until Stickup rock is in line with the western end of Mound islet, 340°, then steer with this mark on until Finger rock is in line with the western point of Kungtung tao, when proceed as convenient to the anchorage.

From the westward Chifu peak and the peninsula are conspicuous and appear from a distance as an island, the low sandy isthmus connecting the peninsula to the mainland not being visible. To anchor under the Kungtung islands, after rounding Sentry rock, steer for Knob point until Southeast island bears 94°, when it is over the sandy flat between the two higher parts of Kungtung tao, which is the clearing mark for West sand spit; then run in southward of that line and anchor as convenient.

Sailing vessels bound into or leaving Chifu should use the entrance between Chifu cape and Kungtung islands in preference to the eastern entrance, to avoid the risk of getting embayed between Chifu bluff and cape Cod, where the prevailing northerly winds throw in a heavy sea, rendering it unsafe to anchor and difficult to claw off.

Chifu or Yentai, where the foreign settlement is, stands on the sandy shore of a small bay westward of Tower hill. On the slope of the hill facing landward are some European houses, the highest of which is the British consulate. There is a Chinese customs establishment. The population is estimated at 120,000.

Chifu is to be made a naval port, with barracks and a naval college.

The foreign community in Chifu has much increased of late years. Between the Chifu club and Middle point many foreign residences with their walled inclosures skirt the sandy beach. The Russian consulate, which has a tall flagstaff, stands near the middle of this bay.

There are 2 hotels and 2 hospitals in Chifu.

Landing.—A sea wall or bund has been constructed along the eastern shore of the bay within Tower hill for a length of 2,174 feet. The bund has an average width of 50 feet; it is provided with 7 sets of landing steps, 2 jetties, a cargo slip, and a boat slip. The depth of water at the end of the 2 jetties is 4 to 6 feet at low-water springs.

Landing is probably still difficult during strong northerly or northeasterly winds.

Boats approaching the landing must give the shore a wide berth to avoid the outermost rocks. Those approaching the eastern beach must clear a rock, which uncovers at low-water springs, and lies 60 yards off shore at 150 yards southward of Tower point, the eastern extreme of Tower hill.

Repairs.—There are no facilities for repairs at Chifu. It appears safe to beach vessels southward and westward of the village at the head of Village bay, as even with strong northeasterly winds hardly any sea would be experienced there.

Time signal.—A black ball is hoisted at a mast on Tower hill and dropped at 0h. 0m. 0s. mean time of the meridian of 120° E., or 0h. 5m. 34s. local mean time, corresponding to 16h. 0m. 0s. Greenwich mean time, on Wednesdays and Saturdays. A gun is fired at the same time.

Storm signals are made from the signal station on Tower hill. A black ball is here hoisted above letter G flag for the gale signal.

Light.—An intermittent red and white light every 10 seconds, thus: Light, 8 seconds; eclipse, 2 seconds, is exhibited from a white lantern placed on the native tower on Tower hill, Chifu.

The light is elevated 175 feet above high water, and is visible from a distance of 19 miles; it shows the following sectors: Red from the bearing of 210° to 218°, white from 218° to 235°, red from 235° through west to 276°, excepting where obscured by Kungtung tao, white from 276° to 284°, red from 284° to where it is cut off by the land. The light also shows red within the harbor from the bearing 151° through south to 210°.

Coal.—About 5,000 tons of Japanese coal is usually in stock.

Coaling is performed by means of lighters, and labor is plentiful. With strong winds from between north-northeast and northwest, and also from the eastward, a heavy sea rolls in, making coaling impossible.

Supplies.—Contractors supply excellent beef and fair mutton, and there is abundance of vegetables and fruit in season. Game and wild duck abound in autumn and winter. Oysters and fish are plentiful, especially cod, and about the end of March the herring fishery commences, affording occupation for the whole fishing population of this and also other parts of the coast. Native shops supply provisions and stores to Europeans and to the shipping, and foreign stores supply certain kinds of foreign imports, but clothing and other necessaries of the kind and luxuries are usually procured from Shanghai and Hongkong.

Compradors supply water brought from the interior, but it is unfit for drinking.

Trade.—In 1905 the gross value of the trade of the port was $33,356,835. In the same year 2,089 steamers and 6 sailing vessels, the aggregate tonnage of which was 1,749,031 tons, entered the port. The inland steam navigation amounted to 338 entries, with a tonnage of 119,204 tons.

Communication.—Chifu is an important port of call for a number of steamship lines, which converge from Hongkong and Shanghai; from Japan, Korea, and Vladivostok; and from Tientsin.

Telegraphic communication.—There are telegraph cables from Chifu to Shanghai, to Tsing tau, to Wei hai wei, to Taku, and to Port Arthur (Ryojun ko).

Winds.—The winds in a general way follow the courses and periods of the monsoons. The summer winds are chiefly southeasterly; the winter winds are northwesterly, strong and often violent, and although they are intermittent they are more constant. In the winter gales the wind usually commences from about east-northeast, backs through north to northwest, and blows with the greatest violence from the northward; the gales are occasionally accompanied by a very high sea; a slight steady fall of the barometer followed by a rapid rise is the only warning.

Frequently in summer the wind is northeasterly during the heat of the day, and southerly at night, forming regular land and sea breezes.

Climate.—The climate of Chifu is undoubtedly the most salubrious of all those places open to the residence of Europeans on the coast of China, presenting a dry atmosphere, a thoroughly bracing winter, and sea air and bathing. The summer, which does not, however, last much more than 2 months, is hot, the thermometer rising to 85° and 100°. January and February are very cold, with much snow; April is generally wet; May is genial spring weather; June is fine and warm, with rain; July and August are hot, and more or less rainy, with squalls; the beginning of September continues warm, whilst the latter part of this month and October are dry and sunshiny, but cool. November and December are cold, with much snow, in the latter month. The usual minimum temperature is about 20°.

Chifu has been resorted to as a sanitorium by individuals from the southern ports, and bids fair to attract much attention in this respect.

Islands.—A group of islands, consisting of four larger islands and several smaller islands and rocks, lie about 3 miles to the northeastward of Knob point.

Evans island (Kungtung tao) is the largest of the group, its northern part is 200 feet high, its central part is low and sandy, and its southwestern point has a small rise.

There are three naval rifle ranges on the island.

Light.—A fixed and flashing white light with a group of 3 flashes every 20 seconds and visible 22 miles is exhibited from a circular tower, with red and white bands, 45 feet high and 242 feet above high water situated on the summit of Evans island. It is obscured by Oregon island to the northward between the bearings 201° and 210°.

Fog signal.—In answer to a vessel's fog signal two guns are fired with an interval of 5 minutes between them; and the firing is repeated after a further interval of 8 minutes if the vessel's underway fog signal continues to be heard.

East sandspit, which shows at low water and greatly shelters the anchorage from easterly winds, extends ¾ of a mile from the southwestern point of Evans island, and its extremity, which is steep-to in 4 fathoms, bears 213° 1½ miles from the light-house.

Buoy.—A spar buoy, painted red and black in vertical stripes, surmounted by a small black wicker cage, is moored in 23 feet at about 100 yards off the end of the spit.

When necessary the cage is removed in winter.

Kungtung flat, between the islands and Knob point, has depths of 24 to 28 feet over it.

Oregon island lies about ¼ mile to the northward of Evans island. It is 230 feet high and has two peaks at its northwest corner.

Finger rock is a conspicuous vertical pillar connected by a reef to Oregon island, 400 yards eastward of it.

Wisconsin island lies about ¼ mile westward of Evans island. It has a slight elevation (70 feet) at its northern end. There are three rifle ranges on the island, which is surrounded by shoals except on the northern side.

Kentucky island (Ku tao) lies about ⅞ mile northwestward of Wisconsin island. It is surrounded by rocks and shoals. There are three rifle ranges on the island. There is a mound 70 feet high on the southwestern extremity of the island.

Stickup rock lies about ⅜ mile north-northwestward of Kentucky island and is the southwestern island of the group. It is of similar formation to Finger rock.

Double island, 51° 2²⁄₁₀ miles from Evans island light-house, appears to be divided into three parts on westerly bearings, its northern part being wedge shaped and its southern and highest part is an irregular mound 125 feet high. Rocks extend from its northwestern and southern points.

North rock, 51° 2½ miles from Double island, and the northeastern islet of this group, is 82 feet high. On westerly bearings it appears round, with a smooth top sloping southward, but on southerly and easterly bearings it is wedge shaped. A small rock, awash at high water and nearly always visible, lies 56° 500 yards from North rock. It is steep-to with 9 fathoms close outside it.

Southeast island, 116° 1¼ miles from the light-house, is 55 feet high. Three high rocks lie between Southeast island and Evans island, and there is a rock with a depth of 9 feet over it on which the sea breaks at low water at 800 yards northwestward of Southeast island.

Coast.—The coast from Knob point curves to the southward and eastward to Tashan point, a distance of about 7 miles. To the southward the coast is a low sandy plain with the exception of a hill 267 feet high about 2 miles westward of Tashan point.

Lungmun harbor.—Its entrance is over a bar situated about southwestward of Tashan point, the southwestern end of Yungma tao, but the depth over the bar being variable, it should be examined and buoyed before entering in any vessel.

For about 800 yards within the bar the channel is nearly 100 yards in width with depths of 18 to 29 feet, and is well sheltered from all winds. The landing place is at Temple point, the southern extreme of Yungma tao, which is steep-to, and where the principal village is situated. A bar of 16 feet southwestward of Temple point separates the outer and inner channels.

Yungma tao, a narrow island about 4 miles long trending about 52° from the southeastern side of an extensive bay. Two conspicuous hills, each about 375 feet high, the southern of which is Tashan, rise at the southwestern part of the island; the other hills on it are low; the cliffs at the northeastern end are 40 to 50 feet high.

White Rock point is the northern point of Yungma tao, and is so named from the white rock, 55 feet high, lying about $\frac{3}{10}$ mile off the northeastern extremity of the island. White Rock point must not be mistaken for Evans island, Kungtung tao, at the entrance of Chifu harbor.

Coast.—The coast to Yau yuen tsui (Finger point) trends nearly eastward to the mouth of the Western inlet, a distance of 16 miles from White Rock point; from there it trends northeastward for 7 miles to Yau yuen tsui; the shore is a low, flat, sandy plain.

There are a few isolated, prominent hills of moderate elevation, 1 to 3 miles from the coast, rising at from 4½ to 12 miles inland to a rugged, mountainous range, from which a spur descends to the sea at 4 miles eastward of White Rock point, terminating in Northwest hill, 858 feet high. One mile eastward of this spur is a lagoon entered by small junks at high water, and a long sand spit stretches from its western entrance point.

Caution.—Westward of Western inlet there are very regular depths of 9 to 10 fathoms off the land, and the lead gives no warning of approach to the shore until close in.

Yau yuen tsui (Finger point) is a narrow peninsula on the western side of Waterwitch bay. Dawson hill, a well-defined peak 685 feet high, is situated at 1½ miles within the point and its spurs form a ridge on the peninsula.

Chu Tau (Eddy island), lies ¾ mile northeastward of Yau Yuen Tsui, is 225 feet high with scarped cliffs. A rock awash lies 200 yards northeastward of it, and at about 200 yards eastward of this rock is a 2½ fathoms rocky patch. Patches of rock, which dry at low water, lie 600 yards southward of the island, and there is foul ground between these patches and the mainland to the southwestward. There is a patch with 11 feet over it at 167° ¼ mile from the southeastern point of the island.

Waterwitch bay, between Yau Yuen Tsui and cape Cod with Eddy island, is open and affords good anchorage. With northeasterly to northwesterly winds a heavy swell sets in. The best anchorage in northerly and northwesterly winds is in the middle of its eastern bight. There is no good landing place in the bay.

Cape Raoul is a bold cliffy point, steep-to. A rock, 3 feet high, lies 400 yards southeastward of it.

Liu chu bay is the bight lying between cape Raoul and Kushi islet; it has deep water, but is not recommended as an anchorage.

Peaked point is the eastern extreme of Kushi islet, which is 95 feet high, cliffy, and separated from the mainland by a narrow cutting at 200 yards northwestward of Shanghing point.

Half Moon bay, between Shanghing point and Peishan point with the islands off it, has deep water in it, but it is quite open to northeasterly winds, which cause a heavy sea in the bay. It is mostly used by fishing junks, and there are two fishing villages at its head.

Peishan point, the northern point of the western entrance to Weihaiwei, has a chain of islets and rocks extending east-northeastward from it.

Round island, 800 yards east-northeastward of Peishan point, is 80 feet high, dome-shaped, and covered with grass. A small islet and foul ground lie between the island and Peishan point.

Outer island, about 800 yards east-northeastward of Round island and the outer of the rocks off Peishan point, is 39 feet high and much broken up; it is steep-to. Some rocky pinnacles, which show at low water, lie 400 yards southwestward of it, but there is a clear passage between them and Round island.

Weigall cove.—From Peishan point the shore trends southwestward for $1\frac{1}{10}$ miles to King Hall point. In Weigall cove, which is nearly midway between these points, is an iron pier with steps at each side of the end where boats can always land.

Narcissus bay, a deep indentation between King Hall point and Flagstaff point, $1\frac{2}{10}$ miles to the southward, has a general depth of about 18 feet, and is mostly used by junks. Weihaiwei town is on its western shore and

Port Edward (Mato) village on its northwestern.

There is a stone pier at about 800 yards westward of Flagstaff point; and also a stone pier near Mato village where steamboats can land at any time of tide.

The commissioners' house is now at Port Edward on the mainland. The offices of the King's harbor master and of the naval executive officer are in a building situated at the northwestern end of the town. It may be distinguished by a white framework lookout. Queen's house is now the royal naval canteen.

Weihaiwei town is walled, its wall inclosing a considerable space allotted to gardening purposes, as well as the town. The population appears to be fishermen and agriculturists. Large fleets of junks come from Laichaufu on the southern shore of the gulf of Pechili and from the neighboring localities, to fish, when the herring season commences in spring.

Flagstaff point, the southern point of Narcissus bay, rises to Flagstaff hill, which is 154 feet high, and has a flagstaff on it.

Light.—A group intermittent red and white light showing two eclipses—thus, eclipse, 2 seconds; light, 2 seconds; eclipse, 2 seconds; light, 8 seconds—shows white from 220° to 228° over fairway of western entrance; red from 228° to 272°; white from 272° to 281° over fairway of eastern entrance; red from 281° to 220° except where obscured by the land. The white light is visible 12 miles and the red light 8 miles. The light is exhibited from a white iron column 24 feet high and 53 feet above high water. There is a white dwelling near the light column.

Weihaiwei harbor is formed by a deep bight in the mainland lying between Peishan point and Chaopeitsui, in which is the island Leukungtau; it is the easternmost harbor on the northern coast of Shantung peninsula, and is easy of access and capable of affording shelter to a considerable number of vessels of moderate draft, but the anchorage for large vessels is contracted.

There are two entrances, the eastern which leads southward of Leukungtau, and the western, which passes northwestward of it.

Western entrance, though much narrower than the eastern, has the deepest water and is always used by vessels drawing over 18 feet.

Eastern entrance is $2\frac{1}{10}$ miles broad and divided in the middle by Itau island. It is navigable by vessels drawing 18 feet of water, which should pass northward of Itau.

Directions.—For the western entrance, which must be used by vessels of deep draft, pass $\frac{1}{2}$ mile northward of Leukungtau, and about 600 yards off the western side of the island; round Observatory island at the distance of about 400 yards, passing between the red and black buoys off that island; and thence steer as requisite for the anchorage, the limits of which are marked to the westward and southward by red buoys, and to the northeastward by black buoys.

At night keep in the white sector of Flagstaff point light; on nearing Observatory island round it at about 400 yards distance, and steer for the anchorage on a bearing of Chaopeitsui light.

From the eastward steer direct for the eastern channel, pass about ½ mile southward of Huanlok rocks, the same distance northward of Itau, and thence to the anchorage. On passing Itau the soundings decrease over an extensive flat to 19 or 20 feet, but the depths increase again as the western end of Leukungtau is approached. Should a vessel pass southward of Itau, give Davy rocks a fair berth.

The lead is a good guide in working up the eastern entrance; the mainland may be approached to about ¾ mile and Leukungtau to 600 yards.

At night, on nearing Leukungtau, keep in the white sector of Flagstaff point light, and when past Itau steer for the anchorage.

Leukungtau is 2¼ miles long east and west and 1 mile across at its broadest part. Centurion hill, 498 feet high, is its highest point, and from it ridges run through the middle of the island, forming a backbone; on Centurion hill is a hut and flagstaff.

The island is barren and nearly treeless, but all its slopes are well cultivated, principally with sweet potatoes, millet, beans, and corn. The population of the island is about 4,000.

Kwoa pu is the northern point of Leukunktau; 80 yards off its northwestern side is a pinnacle rock with 18 feet water over it.

Gaunt islet 100 yards off Gaunt point, the northeastern point of Leukungtau, is small, rocky, 15 feet high, and has deep water 200 yards northeastward of it.

Huanlok rocks are two reefs off the eastern end of Leukungtau and extend 800 yards eastward of it. There is a channel between these reefs, which are steep-to, with several large rocks on them always above water.

Fog signal.—A fog signal is provisionally established on the eastern end of Leukungtau; it consists of a gun, which, on a vessel's underway fog signal being heard, is fired twice with an interval of 1 minute between. If the vessel's fog signal continues to be heard the firing is repeated after 10 minutes.

Township.—The township is on the southwestern end of the island, and it is being adapted to naval requirements. Queen's house is the largest, and is used as the Royal naval canteen.

East village, on the middle of the southern side of the island, is occupied entirely by Chinese.

Pier.—An iron pier, 765 feet long, runs out from about 400 yards eastward of the western end of the southern coast of Leukungtau; at its outer end there is a depth of 23 feet, and at its inner end are two sets of steps where boats can land at any time of tide.

Ferry.—A steamboat plies by day between the stone pier, Leukungtau, and Mato pier.

Hospitals.—There is a civil hospital on Leukungtau and at Mato (Port Edward).

Light.—A fixed red light is exhibited, at 20 feet above high water, from the end of the iron pier, and is visible from a distance of 5 miles.

Observatory island, off the western end of Leukungtau, is connected by a causeway which forms the northern side of a boat camber; the camber is partially dry at low water.

Repairs.—Small repairs to machinery and repairs to boat's boilers can be executed at the naval establishment at Weihaiwei.

Position.—The observation spot, at the western end of Leukungtau by the parade ground, is marked by a stone with Lat. 37° 30′ 10″ N., Long. 122° 09′ 44.25″ E., cut in it.

Supplies.—Meat, bread, vegetables, and fruit are obtainable, but there is no water fit for drinking. Boiler water is brought from the mainland.

Acute diarrhea has been traced to the injudicious eating of vegetables and fruit; both should be well cooked.

Most of the supplies are brought from Chifu in junks.

Communication.—There is a weekly steam service between Shanghai and Chifu. A small steamer runs with mails to Chifu, and a contract is being arranged to run a weekly steamer between Shanghai and Weihaiwei.

Mails from England take from 36 to 38 days in transit. There is overland mail communication with Chifu about three times a week.

Telegraph cable.—A telegraph cable is laid to Chifu.

Coal.—No stock of coal is kept for supplying shipping.

Anchorage.—Vessels of deep draft anchor in the pocket southward of Observatory island where the water deepens; the sides of the pocket are steep.

Vessels drawing 17 feet anchor anywhere southward of Leukungtau.

Mercantile vessels may anchor in the Admiralty waters at Weihaiwei, by permission of the senior naval officer, in such positions as he may point out.

With strong winds from the eastward of north or south, a swell sets through the Eastern entrance, rendering the anchorage uncomfortable, and raising a short sea which makes boat work difficult.

To the southward and southeastward of the iron pier the depth has been increased by dredging to not less than 31 feet at low water.

A convenient berth for a large vessel, in the winter time, is at a distance of about 600 yards 259° from the head of the iron pier, where the holding ground is good.

In Bluff bay, northward of Observation island, the bottom is very soft and vessels are liable to drag.

A mooring buoy, available for the use of coasting steamers, is moored 400 yards to the southward of Cowan pier.

Buoys.—A large red conical buoy is moored in 5 fathoms at 700 yards westward of Observatory island, on the western side of the Western channel, and a black can buoy at 130 yards westward of Observatory island on the eastern side of the Western channel.

Two small red can buoys mark the southwestern, and two small black cask buoys the northeastern, 5 fathoms limit of the pocket of the anchorage southward of Observatory island.

Quarantine anchorage.—The anchorage for vessels placed in quarantine is westward of Itau island, with Flagstaff point lighthouse bearing northward of 280° and the joss house near East village bearing westward of 355°.

Itau, or Sun island, in the eastern entrance, is small, rocky, and built up into a fort, now destroyed. It is fringed for 175 yards on its northern and eastern sides by a reef, on the edge of which are large rocks awash at high water.

Davy rocks, 375 yards southeastward of Itau, are a rocky patch almost awash at low-water springs, and generally very difficult to see.

Wrecks.—A wreck lies 190° 1,225 yards from the outer end of the iron pier, and it is marked by a wreck buoy; another wreck lies 106° 2,075 yards from the pier.

Tides.—It is high water, full and change, at Weihaiwei at 11h. 30m.; springs rise 8 feet; neaps range 4 to 5 feet.

A mark is cut 4 inches below the top of the stone wall at the inner end of the iron pier and 14 feet 3 inches from the western corner of the guardhouse; the soundings are reduced to a level 10 feet 8 inches below this mark.

Caution.—On exceptional occasions during winter the sea level falls 2 to 4 feet below the datum to which the soundings are reduced; this has usually happened after strong northwesterly or northerly winds.

Tidal streams.—The tidal streams turn at an average of 2 hours before high and low water on the shore; the east-going stream beginning at 2 hours before high water, and the west-going at 2 hours before low water. But the times of the turning of the streams depends greatly on the force and direction of the wind; with strong southeasterly and easterly winds the west-going stream continues all day, and after strong northwesterly winds the east-going stream similarly continues.

Generally the streams follow the direction of the coast, and attain at springs at the anchorage at Weihaiwei a rate of 2 knots. The duration of slack water is usually 1 to 2 hours.

The west-going stream divides at Huanlok rocks, where there are eddies and overfalls; the northern portion follows the coast, and the southern portion passes southward of Leukungtau and curves round northward through Western entrance. These streams meet by Round and Outer islands, causing eddies, and the combined stream runs at the rate of some 3 knots off Peaked point, cape Raoul, cape Cod, and Eddy island; this stream at 5 miles offshore is much weaker.

The east-going stream divides at Outer island into two branches, one passing northward, and the other westward and southward, of Leukungtau, which meet again at Huanlok rocks.

Storm signals similar to those used at signal stations of the imperial maritime customs are made from the signal station on Leukungtau.

Trade.—The leased territory at Weihaiwei contains some 330 villages, and the population is estimated to be 123,750. There are four small market towns, where fairs are held every 5 days.

There is no local industry, but a little rope making, boat building, line making, and stone cutting is done. The Chinese inhabitants are either fishermen or farmers. The chief crops grown are maize, millet, wheat, sweet potatoes, buckwheat, turnips, beans, and peanuts. The food of the Chinese is cereals, fish, vegetables, or eggs. Very little fruit is cultivated. The scrub oak is grown to some extent for the maintenance of the silkworms. The raw silk produced is sold to the Chinese silk filatures at Chifu.

There is no export trade except in salt fish, which is carried in junks to southern China. The import trade is not large, and is also carried in junks. It consists of timber, firewood, and maize from Manchuria, and paper, crockery, sugar, and tobacco from southern China. The value of the salt fish exported is about $60.000 annually, and the average yearly import of maize is about 50,000 piculs, valued at $250,000.

In 1905 the total number of steamers that entered the port, exclusive of government vessels and the smaller coasting steamers, was 291, with an aggregate tonnage of 321,005 tons. In the same year the chief articles of export were ground nuts, salt, and salt fish.

Climate.—The winter is cold, dry, bracing, and exhilarating; the summer heat is never really excessive. The rainy season is confined to 4 months, about June to September, during which rain sometimes falls in torrents.

In 1904, the total rainfall amounted to 31.98 inches, of which 20.82 fell during the month of July. In 1905, when the rainfall was 40.23 inches, July was again the wettest month with 12.93 inches.

The prevailing winds during the autumn months are from the northward, and more frequently from north-northwest than any other quarter. Southerly winds last but for a short time and do not attain any appreciable strength. Gales appear to be less frequent than during the summer.

White sandy point, about 3 miles southward of Flagstaff point, is conspicuous from the banks of white sand on it. A broken up ledge of rocks extends 400 yards around the point.

Yangka bay is the deep bay lying between White Sandy point and Lungmiaotsui; it is clear of shoals and outside, 400 yards from its shores, the depth is from 19 to 25 feet. Several streams discharge into the eastern point of Yangka bay.

Lungmiaotsui (Camp point) is named from having old military camps on it. Between it and Chaopeitsui are two bays, with the ruins of an old fort on the point between them.

Ward rocks are a sunken rocky reef running ½ mile northward from the land at 600 yards eastward of Lungmiaotsui. The outer rock is flat and just awash at low water. Its northern edge is steep-to.

Chaopeitsui.—The eastern point of the entrance to Weihaiwei harbor is a bluff cliffy point.

Light.—A revolving white light every 30 seconds, and visible 15 miles, is exhibited from a white iron tower 35 feet high and 94 feet above high water; it is located on the summit of the bluff at Chaopeitsui. The light is obstructed by the land in some directions. The keeper's dwelling and wall are painted white.

Three Peaked point lies 1¾ miles east-southeastward from Chaopeitsui, is so named from three peaked rocks at the foot of the cliff, and is a bluff rocky point, with a ledge of rocks off it that dries at low water and is steep-to. There are several rounded summits behind it; on Beacon hill, the highest and 313 feet high, is a stone beacon 20 feet high.

Yin shan bay, at the western end of the bight lying between Chiming island and Three Peaked point, affords good anchorage, sheltered from winds from southwest to northwest. A heavy swell sets in with northeasterly winds. There is a rock, which dries 2 feet, on the southeastern side of the bay at 500 yards from the beach. Two rivers flow into the bay, and at the entrance of the southern one is a lagoon at high water, which small junks enter.

Chau yang point.—There is a good landing place under the west cliff of the point (40 feet high), situated 1½ miles southwestward from Chau yang point. A small house and a flagstaff, not conspicuous, stand on the 40-foot point.

Chiming island, 1 mile off Chau yang point which projects considerably, is 245 feet high, flat-topped, fronted by extensive reefs on three sides, and joined to the mainland by a rocky flat, over which is a depth of 3 to 4 fathoms. A large salt lagoon opens into the sea eastward of the rocky point.

Coast.—The coast eastward from Chiming island to the high land of Shantung promontory is low, sandy, and broken by rocky points, the distance from Chiming island to Northeast promontory being about 21 miles.

Shantung promontory, eastward of Yung ching plain, extends 6 miles eastward and is 2 to 3 miles in breadth; it is hilly. The eastern extreme is in Lat. 37° 24′ N., Long. 122° 43′ E.

The hills make on northwesterly or southeasterly bearings somewhat like a number of detached islets.

Near the extreme of the promontory is a sharp, smooth, conical hill, from which a ridge or shoulder extends to the sea, and ends in a rugged broken cliff, with a small square pagoda or tower on it; a large temple stands on the southern side of this hill, a little below the summit. There are two rugged hill masses southeastward of Sharp peak, the southeastern of which forms a projecting cape on the southern part of the promontory, named Lung siu tau, or the Dragon's beard, which terminates in Joss house point, flat, rocky, and with a joss house on it.

There is a tide race for 1 mile off the extreme of the promontory, which is steep-to, with a depth of 25 fathoms at ¼ of a mile, and 50 fathoms at 1¼ miles eastward of it. This later depth is at the southern part of a gully 1 mile wide, which thence extends north-northwestward 4½ miles, and is 37 to 50 fathoms deep over sand and gravel, or mud and shells. Between about 5 and 13 miles off the promontory is a belt of 17 to 19 fathoms, outside of which the water deepens gradually to 40 fathoms.

Tidal streams meet some 3 miles off Shantung promontory and cause overfalls.

Tides.—It is high water, full and change, at Shantung promontory at about 4h. 0m.

The coast on the northeastern side of Shantung promontory, 2½ miles in length, is rocky and indented with several small bays; there are many off-lying rocks both above and below water. Within this coast are low hills. Bluff point, its northwestern end, is a steep bluff.

Malin cove between Bluff point and Separation point, with an entrance ½ mile wide, affords a good anchorage in 5¼ fathoms, and is protected from all but northerly winds.

Alceste island, 1¼ miles northward of Bluff point, is 211 feet high, flat-topped, and bounded by cliffs. A cluster of reefs, the outer of which is awash, but the others are higher, extends 800 yards northward of its eastern point. A small pinnacle rock, with a small rock awash close southeastward of it, lies a quarter of a mile southward of the same point. The tidal streams are strong between Alceste island and the promontory.

Caution.—It is unadvisable to use the channel between Alceste island and the promontory, and on no account should it be taken at night.

Tiger's tail rock (Rodney rock) lies 800 yards off the northeastern coast of Shantung promontory, at 2 miles north-northwestward of the light-house; it is awash at low-water springs and is clearly seen in a heavy sea.

Directions.—Vessels bound northward into the gulf of Pechili in the spring have passed Shantung promontory in foggy weather without making it. Thick weather being frequent and the tidal streams rapid, every opportunity must be taken to fix the vessel's position; when thick the lead must be constantly used, and sometimes it is necessary to anchor at night.

Light.—An intermittent white light with red sector every 15 seconds—thus, light 13 seconds, eclipse 2 seconds—and visible 22 miles, is exhibited from a circular white stone light-house, located on the eastern extremity of Shantung promontory. It shows white between 114° and 146° and between 159° and 17° over an arc of 218°; red between 146° and 159° and between 17° and 45°; between 117° and 158° the light is obscured seven times by land. The keeper's dwellings are white.

Fog signal.—In thick or foggy weather a siren gives two blasts (high note, low note), each being of about 2½ seconds' duration, in quick succession every 2 minutes.

If the siren is disabled, in answer to a vessel's fog signal, two guns are fired, with an interval of 1 minute between them, and should the vessel's underway fog signal continue to be heard, the firing is repeated after an interval of 10 minutes.

Yung ching bay.—Yung ching bay, lying between Joss house point and Mashan point, the southern projecting cape of Shantung promontory, is 4½ miles wide and affords shelter from northeasterly winds in 4 to 8 fathoms, mud. There is a small rocky point, with a shrine on it, on the low sandy shore about the center of the bay.

Yung ching.—An extensive sandy plain, 2 to 6 miles across, separates Shantung promontory from the high land of the peninsula. Southward of a sandy hill, 200 feet high, on it, or at about 3½ miles northwestward of Mashan point, is the walled town Yung ching, with large lagoons on both sides of it.

Mashan point is formed by a rugged ridge which terminates in a cliff. Reefs, above water, extend 800 yards eastward of the point.

Ellen rock, 97° 1,400 yards from Mashan point, is 6 feet high and steep-to.

Yangyuchih bay (Rocky bay).—Rocky bay runs in 2½ miles northwestward between Rocky summit headland and Chalk saddle promontory. The southern extreme of the promontory is low with a shrine on it, and off it is a flat rocky island, eastward of which and close off the extreme is a rocky patch above water; 800 yards southeastward of the island is a 2 fathoms rocky patch which may be connected with it. There is anchorage for one vessel in 3¼ fathoms.

Litau bay, 2½ miles southward of Rocky bay, is rather shallow and exposed to northeasterly winds, but sheltered from the eastward by the two Gravel islands, ¼ mile apart, which are connected with each other and also the shore by reefs dry at low water. These islands are 120 to 150 feet high, with gravel cliffs, and appear bold-to, with the exception of the eastern point of the outer island, which has a reef off it. The shores of the bay are very rocky; a large, flat reef, always above water, lies 1 mile northward of the outer island and 1,600 yards off the northern point of the bay, from which point rocks dry halfway out toward it. Small craft anchor in the bay and many junks are found here.

Litau is a small town on the southern side of Litau bay, and has a considerable coasting trade.

One mile northwestward of Litau bay is another small bay of similar character. Its northern point is a steep, narrow headland, on which is Rocky summit, 200 feet high; there is a small islet off the head. A low island surrounded by reefs lies nearly in the middle of the bay, off a point to which it is attached by reefs dry at low water.

Tides.—It is high water, full and change, at Litau bay at 3h. 0m.; springs rise 6 feet, neaps 4 feet.

Martha point, 5 miles southward of Litau bay, is a low, flat, rocky cape, forming a double point, with a small bay between and reefs off both points. Long reef extends ½ mile northeastward of the northern projection of the point and dries in parts; there is usually a heavy tide race off it. The point should be given a berth of 1¼ miles, and the water not shoaled to less than 12 fathoms until further examined, for the ground to the eastward is very uneven, with depths of 12 to 20 fathoms.

Aylen bay is between Martha point and Shua tau head. Middle point, a rocky head 100 feet high, with reefs lying 200 or 300 yards from it, juts about ½ mile from the middle of the northern shore of the bay, which it divides into two parts, each having a depth of 3 to 4 fathoms water and fair anchorage in northeasterly winds. The head of Aylen bay is a low, sandy valley.

Shua tau head, 4 miles southwestward from Martha point, is the northern point of Sangkau bay; its eastern face is 1 mile in length, bordered by broken and irregular cliffs and fringed with reefs extending 400 to 600 yards, on one of which is a large rock 25 feet high. On the northern point of the head is a reddish, smooth-topped hill 240 feet high, with a long slope toward the southern point, which is 100 feet high and flat.

Sangkau bay, between Shua tau head and Flat rocky point, 7 miles southward, has on its western and southern shores two hills, both isolated and of a steep, rugged character; that on the western shore is Rugged Bay hill, 500 feet high, and that on the southern is Laumashan, 395 feet high.

Boulder rock, about 1 mile offshore at 4½ miles westward of Flat rocky point, is 40 feet high, with a depth of 3 fathoms close outside; a reef extends ½ mile southwestward of it. A reef 2 miles in length, north and south, on which only a few rocks show at high water, lies about 1 mile offshore northward of Boulder rock.

Within this reef Rugged Bay hill rises, and northward of the hill a small stream issues from a lagoon; fronting the lagoon are sand banks and a reef 5 feet high at 1,200 yards offshore.

The shore of the bay from the lagoon trends north-northeastward for about 3½ miles, and is low and sandy; it then turns eastward, becoming low cliffs.

Anchorage.—There is anchorage in Sangkau bay in 4 to 6 fathoms, and under Shua tau head in 5 to 7 fathoms, with shelter from northeasterly winds.

Flat rocky point is ¾ mile in extent east and west, very low, flat, and makes like an island, being only joined to the coast by a narrow isthmus of sand 2 miles in length, on which is a small village. There is a small village and temple on the inner part of the point.

At 1,400 yards southwestward of the point are two rocks, with a ledge, which uncovers at low water, extending 800 yards east-southeastward of them. The bay to the southward of these rocks has been only partially examined, but appears clear and affords anchorage in 5 to 6 fathoms, avoiding the reefs.

Reefs extend about 400 yards off the eastern and southern sides of Flat rocky point, which may be safely approached, but a rocky spit extends 1 mile from its northern side, to clear which do not bring Boulder rock in Sangkau bay westward of 254°. The northern shore of the sandy isthmus is also shoal, and a reef which covers lies 1,400 yards off the village on it.

Ears rock lies 4 miles 180° from Flat Rocky point, is 57 feet high, and, from some directions, has the appearance of an ass's ears. It is rocky on all sides, the reefs stretching to ¼ mile northward and southward of it, and also toward a low point of the coast 1¾ miles in a west-northwest direction. A reef which dries lies 1,700 yards northward of Ears rock.

Ears rock can be passed to seaward at the distance of 1 mile in 10 fathoms. The bay between Daudung tau, 3 miles to the southward with the shoals around it, and Ears rock with the shoals west-northwestward of it, is clear of danger, and it affords anchorage in 5 to 8 fathoms.

Schwilp patches, 600 yards east-southeastward of the Laudiau rocks, are about ¼ mile in extent with depths of 21 to 28 feet over them, rock bottom.

Cape Macartney (Daudung tau), the eastern point of Mui tau, is low and sandy; a reef extends ½ mile east-southeastward from the cape, and near its outer extreme are the Laudiau rocks, one of which is 8 feet high. A detached reef, drying 1 foot, lies 56° 1,200 yards from the cape, and a rock with 8 to 10 feet over it lies 34° nearly 1,600 yards from the cape.

Directions.—Sailing vessels bound northward, owing to the prevalence of northerly winds, often have to beat to windward along this coast, which can seldom be done in less than 2 days; such vessels should keep in shore, taking advantage of the favorable tidal stream and anchoring during the adverse, rather than beat up in the offing against the usual short chopping sea.

Southeast promontory (Mui tau) is the low island, 2¾ miles long, northeast and southwest, and ½ mile wide, forming, with the sands connecting it to the main, the eastern side of Shitau bay; the southwestern end of the island is a bluff 97 feet high.

Pinnacle rock, 40 feet high, lies 200 yards southwestward of its southwestern side; other rocks and reefs extend for about 600 yards round its southern point. From the southern point of the island the coast extends eastward 1$\frac{1}{10}$ miles to its southeastern point, and it is bordered by shoals. A detached reef, which dries 2½ feet, lies nearly 600 yards southwestward of the southeastern point.

Anchorage.—There is anchorage, in northerly and northwesterly winds, off the southern coast of the island, for large vessels in 6 fathoms with the lighthouse bearing 41° distant 1,300 yards, and for small craft in 4 fathoms at about 375 yards northwestward of the detached reef.

The coast of the island, from its southeastern point, is low and cliffy; it is bordered by extensive reefs, and it should be passed with caution.

Light.—A revolving white light every 30 seconds and visible 16 miles is exhibited from a circular tower with red and white bands 77 feet high and 76 feet above high water, and is located near the southeastern extremity of Mui tau island at the southeast promontory.

The keeper's dwelling and walls are painted white.

Fog signal.—A siren gives a blast of 4 seconds' duration every 90 seconds.

Shitau bay lies westward of Mui tau island (Southeast promontory), and is joined to the main by extensive sands, 1¼ miles across. The bay is about 2¾ miles wide at its entrance, and the same in depth. The northern shore of the bay is very rocky, and is under Sharp peak, a rugged peak, 848 feet high, and the southern extremity of a range, the center part of which is Temple saddle, 866 feet high; there is but a slight depression between the two hills.

Shitau stands on the western shore of the bay westward of a small rocky head. It has some trade with Shanghai.

Small vessels anchor in 21 to 22 feet of water, east-northeastward of the town, and right across the bay, or between the outer points in 5 to 6 fathoms, mud bottom; near the shores there are rocky patches. Oyster rock, 4 feet high, the southern end of a reef in the northern part of the bay, in line with Sharp peak, 338°, leads into the bay, clear of all dangers. The bay is open southward and southeastward, but in northerly winds it is a good and convenient place for anchoring in while waiting for the north-going tidal stream when beating round Shantung peninsula. Anchorage can be obtained in 6 to 10 fathoms, westward of and outside the bay, at 1 to 4 miles from the land.

Tides.—It is high water, full and change, at Shitau bay at 2h. 25m.; springs rise 8 feet, neaps 5 to 6 feet. Owing to diurnal inequality the morning tide occurs 10h. 30m. before the afternoon tide.

Wangkia bay is a small circular bay, 2½ miles west-southwestward of Shitau bay, with a stream running into it from a valley on the northwest. Two islands lie at the entrance and are connected by reefs to the western point of the bay, on which is a small town. These islands shelter the western part of the bay from the southward, but it is open to the southeastward. The entrance, ¾ mile wide, is eastward of the islands above mentioned, which are steep-to, but a reef lies ¼ mile off the eastern point of the bay. The western side of the bay is low and sandy.

The eastern point of the bay is high and cliffy. The anchorage is between the outer island and the opposite high shore in 3½ to 4½ fathoms, or northward of the inner island in 13 feet.

Tides.—It is high water, full and change, at Wangkia bay at 2h. 30m.; springs rise 9 feet, neaps 7 feet.

Tidal streams—Shantung peninsula.—The times of high water at various parts of the promontory, from Tsinghai bay to Weihaiwei, alter considerably at short intervals of distance, whilst the tidal streams change almost simultaneously at short intervals of distance. The change of stream is therefore referred to the time of high water at Sangkau bay, on the eastern face of the peninsula, as a standard.

Sangkau bay is adopted because it is the place on which the tidal wave first strikes the coast of Shantung, and its establishment has been more accurately determined than that of any other position on this coast.

At the time of high water in Sangkau bay and during the first hour of ebb the south-going stream is at its strongest from Alceste island toward Staunton island. At the second hour of ebb it slackens at Alceste island; at the third hour of ebb the stream slackens off Sangkau bay, and the west-going stream commences at Alceste island; at the fourth hour of ebb the stream slackens at Staunton island; at the fifth hour of ebb the east-going stream commences at Staunton island and sets round the promontory to Weihaiwei; this stream continues until the second hour of flood, during which it slackens and the east and south going stream commences at Alceste island; this occurs a little later at Sangkau bay; at the third hour of flood the east-going stream slackens and the west-going stream commences at Staunton island; the south and west going streams are then running from Alceste to Staunton island.

The rate of the stream off Staunton island is 2 to 2½ knots at springs, and ½ to 1 knot at neaps, which is also about the rate of the stream along the coast northward, except off Shantung promontory and inside Alceste island, where it is probably 3 or 3½ knots at springs. In the bays the stream is weak and changes generally an hour or two before the stream outside. Eddy tides are found in some of the bays, and there is also an eddy tide close southward of Shantung promontory. The stream at Staunton island is accelerated by a favorable fresh breeze, and the contrary stream is retarded both in duration and force, particularly at neaps.

Coast.—The coast from Wangkai bay to South cape, a distance of 2 miles, trends west-southwestward, where it turns to the westward a little northerly to Ching Hoi point, a distance of 8 miles. There are banks and outlying rocks and islands off this stretch of coast as follows:

Staunton island (Su su shan) lies 6 miles 221° from South cape. It is a narrow island, 366 feet high, about 1 mile in length northwest and southeast, and from 200 to 400 yards wide. A small islet lies off its northwest point. There is a fishing village and landing place in the northern side of the island, and another on its southwest side. These villages are only occupied during the spring fishery.

A rock, with less than 6 feet of water over it, lies 375 yards southward of the south point of the island, and another, with 4 fathoms over it, is situated 200 yards southwestward of the above.

Channel rocks.—South Channel rock, 68 feet high, lies 1 mile 331° from Staunton island. A rock, with less than 6 feet of water over it, lies 400 yards 327° from South Channel rock.

North Channel rock lies 1¾ miles 345° from Staunton island. It is a cluster of three islets, the highest being 86 feet. Reefs extend over 400 yards southward of it, and a rock, with less than 6 feet of water over it, lies 400 yards 14° from the highest islet.

The passage between North and South Channel rocks, owing to the above-mentioned rocks, is not to be recommended.

Witch rock, having 1½ fathoms over it, lies 3 miles 217° from South cape and 3 miles from Staunton island. It is steep-to, with 9 to 10 fathoms around, and breaks heavily.

Caution—Fishing nets.—From November until the end of June the water is strewn with fishing nets for a distance of 5 miles from the land. These are floating bag nets with a framework of spars, some of which are of considerable size. They are moored to the bottom in long rows, sometimes ½ mile in length, and during the strength of the tide are not visible.

Ching hoi point is a low cliffy point, 40 feet high. Low island, 60 feet high, lies 800 yards southwestward of the point, and is connected to it by a chain of rocks. Rocks extend 200 yards seaward of Low island. The walled city of Ching hoi stands just to the northward of the point. The city is only partially inhabited and the walls are practically in ruins. Immediately northward of the city is a rather conspicuous temple.

Ching hoi bay, the entrance to which is 7 miles wide between Ching hoi point and Red islands, is not of much use except for vessels of shallow draft. The shore line of the bay is generally low and much broken up by shallow lagoons.

Lockhart inlet, on the north side of the bay, runs in a northerly direction for 7 miles. It appears capacious at high water, but the navigable channel is only 400 yards wide between steep banks of sand and mud. The channel has 5 fathoms of water in it between the entrance points, and 3 to 4 fathoms may be carried for 4 miles, whence the inlet takes a curve to the eastward. To reach the entrance it is necessary to cross a bar of hard sand having only 5 feet of water over it at low water. The tidal stream in the inlet runs at the rate of 4 knots.

Red cliff point, about 7 miles west-northwestward of Ching hoi point, the termination of a somewhat hilly peninsula separating Mud flat and Ching hoi bays, is a sandy spit stretching out ½ mile from the mainland. On the spit are two masses of rock, the inner 90 feet high, and the outer, at the end of the spit, terminates in a steep reddish cliff 115 feet high.

Red islands, extending to a distance of 1½ miles off Red Cliff point, are a group of rocky islets connected by reefs and sand banks to the shore. The easternmost is a sharp pinnacle rock 60 feet high. The outer island, 107 feet high, is separated from the others by a shallow channel about 600 yards wide, and has a reef off its south point, with a detached rock, 40 feet high, 500 yards southward of it.

Gribble rock, with 1½ fathoms over it, lies 2 miles, 256°, from the summit of the outer Red island.

Coast.—At Red Cliff point the coast recedes irregularly to the northward and then to the westward and southward to Goose point, which lies about 5 miles northwestward of Red Cliff point, forming an inclosed flat known as Mud Flat bay, through which there is a shallow channel for boats and junks. From Goose point to Phœnix point the coast trends west-southwestward for a distance of 11 miles. The northeastern end of this stretch is low and flat, but the southwestern end is hilly, terminating with Mt. Davis, 1,297 feet high. Shoal water extends 2 to 3 miles off the shore.

Cochran landing is a convenient and sheltered landing when the wind is on shore, and lies about ¾ mile northward of Phœnix point, where the coast curves slightly back to the westward.

Poh wang tan.—From Phœnix point the coast trends west-southwest for a distance of 7 miles to the entrance of a small lagoon, and then southerly for 4 miles to Tautsui head, forming a bay known as Poh wang tan. The shore line of the bay for 2 miles from Tautsui head is abrupt and steep-to, then low and sandy, broken by rocky points with off-lying ledges. Two miles to the westward of the lagoon entrance is Bamba shan (Middle hill), 427 feet high, with a small temple on its summit.

About 1 mile off the entrance to the lagoon is Yautau, a small wedge-shaped island, 44 feet high. Kungkiata, a low island, 48 feet high, stands on a large reef stretching out from the shore in the northeastern part of the bay, at 3¼ miles to the southwestward of Phœnix point. Reef extends from the southwestern point of Kungkiata for a distance of nearly 1,600 yards to the southwestward, and from the eastern point to a distance of 800 yards.

The bay affords good shelter from northerly and westerly winds. The bottom is soft mud, but the holding ground is not good. Northeasterly winds send a nasty sea into the bay unless under the shelter of Kungkiata. No supplies are obtainable except poultry, eggs, and fish.

Tautsui head (Shantung tau) is a bold hilly headland, separated from the mainland by a sandy isthmus. The highest part of the promontory is Fung hwa shan, 379 feet high, 1½ miles from the head, and on its summit is a large mound. The southern coast of the promontory extends 2¼ miles westward from the head, and off it are 2 islands; the larger, Chutan, is 174 feet high, and connected with the promontory at low water by a sand bank; the smaller island, 1 mile farther westward, is 120 feet high.

Sutherland rock (Hweitan) 3¼ miles, 166°, from Tautsui head, is 24 feet high. A rocky ledge, with 2 to 3 fathoms water over it, extends southeastward from it for a distance of 200 yards, and 1,000 yards, 58°, from Sutherland rock is a rock which dries 1 foot.

Jhushankau, a bay running back 3 miles, lies between Low point and Arthur head, an island 3½ miles to the westward of Tautsui head. Arthur head island is connected with the main by flats which dry at low water; its southern face, 1½ miles long, is bold and cliffy, and over its western part is a sharp, conical summit, 416 feet high; off its western end is an islet about 150 feet high. Central islands, in the bay at 4 miles eastward of Low point, are close together, and joined by a sand bank, the outer and higher being 144 feet high. At 700 yards eastward of the northern island is a rock which covers at high water. A spit, which dries at low water, joins Central islands with the eastern entrance point of Taho inlet.

The bay is shallow, having about 4 fathoms between the points, with an even bottom decreasing gradually. At its head is Taho inlet, with hilly shores on both sides.

Taho inlet entrance is 2 miles northward of Central islands; it is 600 yards wide and noticeable, being between the two western of three conspicuous hills, the center one of which, at about 1¼ miles eastward of the eastern entrance point, is 707 feet high and has been described as tusk-shaped. The eastern hill, 2 miles farther east-southeastward, is 598 feet high, and sharp. The western entrance point of the inlet is 145 feet high, steep-to, and westward of it is a summit 666 feet high. At about 3 miles west-northwestward of the point a very rugged range rises to the height of 1,166 feet.

The inlet has no bar, for the approach is generally deeper than other parts of Jhushankau, but a depth of 2 fathoms at low water springs must be crossed to enter the inlet. The water deepens suddenly to 7 fathoms outside the entrance. A small rock 10 feet high lies ¾ mile inside the inlet, which thence trends northeastward for 6 miles, but the depth decreases to less than 4 fathoms at 2 miles above the rock. The rate of the tidal streams at springs within the inlet and at its entrance is said to be considerable.

The bay between Tautsui and Arthur head appears capacious from the sea, but there is only a small basin having 12 feet of water within. The entrance is 200 yards wide and between extensive ledges of rocks on either side.

Low point is the end of a promontory projecting 1 mile and its sea face, 1¼ miles long, is alternately sandy bays and rocky points. Low water rocks extend in a broad ledge southwestward 1 mile from the western extreme of the point, with uneven, rocky ground for another mile southward, and a reef extends ¾ mile from its eastern extreme.

Tides.—It is high water, full and change, at Low point at 3h. 42m.; springs rise 12 feet.

Hai yang, a walled town 1 square mile in extent, is situated ½ mile within a projecting point of the coast, 7 miles to the westward of Low point and partly on the southern slope of Hai yang hill, 399 feet high. The point is low, and a ledge of rocks 1 mile long above water and another mile under water extends southward from it.

An open bay, with sandy shores, in which are two points with rocky ledges 1$\frac{3}{10}$ miles apart, lies between Hai yang point and Low point.

The coast from Hai yang town to the northern entrance point of Tingtsi river, a distance of 12 miles southwestward, is low, sandy, and broken in three places by projecting ledges of rock stretching out some distance, off the western of which, at 1 mile from the coast, is a detached reef; shoal water extends off this coast, and the depth is only 3 fathoms at 3 miles distance.

Tingtsi river is a deep inlet, but it does not appear to be much frequented. At the head of the inlet stands Chinchiakou town, formerly an important trading place. The entrance is about 3 miles wide, but the navigable channel is less than $\frac{1}{2}$ mile wide and subject to changes.

From South head the right (southern) bank of the river trends west-northwestward for about 7 miles, but there are some large inlets in it, where at low water the mud dries out from point to point. A hill on this side of the river, at 2$\frac{1}{4}$ miles westward of Green head, is 517 feet high, conspicuous, and its summit appears to have been fortified.

The left bank of the river is low, with long projecting reefs, and is faced by extensive sand banks. A hill rising from the level land which forms the northern entrance point, and situated 37°, about 4 miles, from South head, is 292 feet high; Triangle hill, 3 miles farther west-northwestward, is 540 feet high, and shows a remarkably sharp top from all views; both hills are conspicuous.

The river is barred by the bank, consisting mainly of sand, but of rock in places, 400 to 800 yards in width, which stretches off South head; the depth on it is 4 to 6 feet at low water, deepening on both sides to 3 and 4 fathoms.

River islet, 30 feet high, is off the left bank, 1 mile northward of the narrow promontory extending northwestward from South head. The left bank of the river, hereabouts, is steep mud; the river channel has a width of 1,000 yards and a depth of 4 to 6 fathoms. Westward of Triangle hill is an inlet 4 miles long which is dry at low water; above this the river has not been surveyed.

Directions.—At high water springs steer across the Bar spit, in a depth of 15 feet, with the summit of South head 280° and just open to the southward of the more conspicuous hill behind it, which mark also leads southward of the sand patch 1 mile west-southwestward of Bar island, and which may generally be discerned by the discolored water. When Bar island bears 69° steer to pass between the shoals off South head and the narrow sand bank, very steep-to, which commences 1 mile west-northwestward of Bar island, and extends 2 miles in the same direction. There is good and perfectly sheltered anchorage southward of River islet in 4 to 6 fathoms. But a depth of 7 feet at low water and 18 feet at high water springs may be carried by steering in with Bar island bearing 255° and when 400 to 600 yards distant from the island, altering course to 221° until the leading mark, given above, is brought on.

Bar island is 99 feet high and 400 yards in extent; it has a round, grassy summit, with cliffy sides fringed with rocks; being off the entrance of Tingtsi river, and inside the sand banks of its bar, it should not be approached from seaward within 2 miles. A rocky patch, which covers at 2 feet rise of tide, lies ½ a mile westward of the island.

Vanhear patch, from ½ mile to 1½ miles northeastward of Bar island, is nearly awash in places at low water.

South or Green head, the southern point of Tingtsi river entrance, 271°, 5 miles from Bar island is a steep-sided, round-topped hill, with a ruined fort on its summit, and is the eastern of a range of small hills northward of the sandy plain that lies at the base of Kwanshan range. From the southward it appears almost disconnected from the mainland.

Reef island lies 166° 3 miles from South head; it is 30 feet high and ¾ mile in extent at low water, but the eastern part is covered at high water with the exception of two detached rocks. A reef ½ a mile in extent lies nearly 1 mile west-southwestward of the island.

Outer island lies 3 miles to the southward, a little easterly of Reef island. It is ½ mile long north and south, narrow, smooth, and grassy, being 116 feet high at its highest point, which is near its center. Its sea face and its northern and southern points are low cliffs, and off its northwestern point is a shingle spit, 400 yards long, which covers at high water.

Anchorage in about 3 fathoms may be obtained between Reef island and Outer island, with shelter from southwesterly winds.

Outer rock, ½ mile southward of Outer island, is 24 feet high, and on the middle of a reef, 400 yards in extent. A sunken rock, which generally breaks at low water, lies ¼ mile eastward of Outer rock.

Tidal streams.—At 2 miles outside Outer island for 2 hours after low water the stream sets to the northward; this deflection from the general west-southwesterly set of the flood stream on the coast is probably caused by the indraft into Tingtsi river.

Long island, 1½ miles southwestward of Outer island, is nearly 2 miles long and undulating, its western hill, which is much the highest, being 173 feet high. Reefs extend 200 to 400 yards off the projecting points of its southern coast. Half a mile off the bay on its northern side is an isolated reef which covers at one-third flood, but which is connected under water by rocky ground to the eastern part of the island, and from which a spit of 2½ fathoms extends 1½ miles northeastward.

End island, off the eastern point of Long island and connected with it at low water, is smooth, grassy, and 68 feet high; the reefs extending from it all show and are steep-to with 3 to 7 fathoms close outside them.

Cliff island lies ½ mile southwestward of Long island, and is 121 feet high. Southwestward of it is a low island, and westward another of less elevation. These islands are surrounded by rugged rocks, and their northern points are connected by stony spits to a large, flat reef which dries, and this again with a low point under the smooth, flat-topped hill northeastward of Boulder hill.

The coast trends south-southwestward from Tingtsi river to cape Adkins, a distance of 11 miles; it is mostly low, generally unapproachable on account of rocky and shallow ground, and it is fronted by several off-lying islands and reefs. The land within is hilly.

Cape Adkins is a steep, cliffy head, and its smooth summit, 230 feet high, terminates a small ridge of hills trending eastward from Boulder hill. On the northern part of the cape, which is rather low, is a small square tower; the southern point of the cape is an abrupt cliff, bold-to. A small round islet, connected with the mainland at low water by a spit of shingle, lies 1 mile north-northeastward from the cape.

Adkins rock lies 187° 1,300 yards from cape Adkins, is 5 feet above high water, very small, and steep-to to seaward.

Surveyor island, about 25 miles from cape Adkins, in Lat. 36° 16′ N., Long. 121° 23′ E., is divided into two portions by a perforated narrow neck; the southern and higher part is very rugged and 297 feet high; there are depths of 16 and 17 fathoms around it. In spring this island is often obscured by fog, which is very prevalent in the offing, although it may be quite clear along the coast.

Katiniau island, which lies 75° 12 miles from cape Yatau, is a small island 243 feet high, with a smaller island about 100 feet high lying 600 yards southward from it, the passage between being 12 fathoms in depth.

Lo shan bay, 8 miles in depth, lies between cape Adkins and cape Yatau, which bears 209° 17 miles from it. The western side of the bay from Village point to cape Yatau, a distance of 9 miles, is along the base of the Lo shan range, and is bold and rugged, with small sandy bays at intervals. The northern extremity of the range terminates abruptly in Sugarloaf hill, 858 feet high, in front of which Center head divides the bay into two nearly equal parts. The depths over this great bay, except off cape Yatau, where there are some soundings of 27 and 30 fathoms, are generally even, decreasing from 7 fathoms at its outer part to 2 fathoms at about 2 miles from the northern head of the bay, from which the mud dries out at a considerable distance in places; but on the western side 3 fathoms may be carried close to the shore.

Shi tau (Green island) (green in spring and brown in winter), 249° 1½ miles from cape Adkins, is 231 feet high, and connected with the land northward of it by a stony ridge which covers at two-thirds flood; on its southern side are detached rocks, above water and steep-to, with 6 fathoms within 30 yards of them.

Bowlder hill, 644 feet high, a remarkable pointed hill surmounted by granite bowlders and strewn with the same some way down its sides, rises on the promontory which forms the northern point of Lo shan bay; at its base the land is low and cultivated, and its coast fringed by reefs. This hill is a good landmark, presenting the same sharp form from all directions.

Star reef lies 224° 1$\frac{6}{10}$ miles from the summit of Bowlder hill, is 800 yards in extent; it covers at high water, excepting three rocks near its center, one of which is 18 feet high; at ½ mile northeastward of the reef, and between it and the shore, is a rock awash at low water.

A reef 400 yards in extent and covering at quarter flood lies 224° 1¼ miles from Star reef; it is steep-to, and it is generally indicated by a breaker. Between it and Star reef is a good and safe 5-fathom channel. Discolored water has been seen ½ mile southward of this reef, but it was well sounded over and the depths found even. Cape Adkins, open southward of Shi tau 63°, leads seaward of this spot.

Tides.—It is high water, full and change, at Star reef at 4h. 30m.; springs rise 11 feet, neaps 9 feet.

Anchorage.—There is good shelter in Lo shan bay from northeasterly winds in 6 to 7 fathoms, with the southern point of Shi tau bearing 86°, Adkins rock being a little open, and Star reef about 333°, but the ground is very rocky, and it shoals rather suddenly northward.

There is also good shelter in rather less than 3 fathoms, about 600 yards northward of Star reef, where at low water the reef forms a good breakwater, but as at high water an unpleasant sea sometimes sets in, it is not recommended.

In the bay westward of Star reef dangerous rollers set in with gales, and continue even after the wind has subsided, but these were not noticed along the coast under Lo shan.

Caution.—During summer it is imprudent to anchor on this exposed coast, as then winds between east-northeast and southeast are frequent, at times blowing hard, but seldom lasting more than 12 hours. In winter winds between north-northeast and northwest prevail, chiefly in the latter quarter near the land, but in the former in the offing. Sometimes there are gales of short duration from southwest, backing to south.

Supplies, including good bread, can be obtained at moderate prices from the villages along the coast. Grapes and pears are cheap and plentiful, and late in the season there are hares and wild fowl.

The fresh water on the shores of Lo shan bay is not good.

Bay island, with a round summit 231 feet high, is 2 miles easterly from Village point, which is the northern extreme of a small promontory 150 to 400 feet high, 2 miles in length north and south, and detached from the mountain range. A small islet lies 198° 600 yards from Bay island, and Neilson rock, at 322° 1 mile from the island, is awash at low water.

Data rock lies 2 miles southerly from Bay island; it is 5 feet above water and apparently steep-to on all sides; there is a channel between it and the shore.

Matterson island lies 38° 7½ miles from cape Yatau and the eastern island in the bay; is 1,200 yards long north and south, 400 yards wide, and its summit 166 feet high, slopes evenly to the sea on all sides. There is a small reef off its northern end, but otherwise there are depths of 6 to 8 fathoms around it.

A rock with 6 feet over it at low water lies 246° ¾ mile from its southern end; it only breaks in heavy weather.

Bobbit island lies 2 miles westward of Matterson island, is 1 mile in length north and south; it rises to a hill, 280 feet high, appearing double in some directions; the northern end is narrow and low. A rock which covers at high water lies 198° 700 yards from its southern point. The passage between Bobbit and Matterson islands appears to be 5 to 7 fathoms in depth and clear, except the rock above mentioned.

Double islets, close together, the higher and western of which is 105 feet high, lie 1½ miles southwestward of Bobbit; the depths around them are 5 to 9 fathoms, and there is a 6-fathom channel between them and the shore.

Harris islets, two in number, lie on a reef dry at low water, the eastern and larger islet being 100 feet high and 1½ miles westward of Bobbit, with a good channel between. A rock, which dries 5 feet, lies 24° ½ mile from the larger islet.

Cape Yatau is the eastern extreme of the southeastern ridge of Loshan; it rises to a height of 1,165 feet, and on northeasterly or southwesterly bearings looks like an island. It terminates in a perpendicular cliff about 300 feet high under a sharp, well-defined hill, 747 feet high, the southern face of which is precipitous. Vessels are liable to be becalmed under cape Yatau, even when a strong northerly wind is blowing, which comes off the mountain in variable flaws and squalls.

Tidal streams.—The rate of the tidal streams off cape Yatau is 2 knots. There is a strong tide race off the cape.

The coast between cape Yatau and Loshan harbor, with the exception of a conspicuous sandy bay northward of Steep island, is bold and rugged, with 11 fathoms at a short distance off it.

Steep island, 179 feet high, lies 5 miles southwestward of cape Yatau; detached rocks, which cover at high water, and foul ground extend 400 yards northward of the island.

Loshan harbor, 7 miles southwestward from cape Yatau, is 1 mile wide at the entrance.

The western entrance point of the harbor is 199 feet high, and a reef, partially dry at low water, extends ½ mile southeastward from it.

Fu tau, 292 feet high and forming the southeastern side of the harbor, is ½ mile northward of Red rock; close off its northwestern side is Little Fut tau, a small round islet, 15 feet high. Fu tau is separated from the mainland by a steep promontory, projecting considerably from the coast, by a 6-fathom channel, 300 yards wide.

The harbor is divided in the middle of its northern shore by a bold projecting point 258 feet high, on each side of which are very shoal sandy bays.

The depth in the entrance to the harbor is 4 fathoms, whence it gradually decreases toward its two heads, but the channel northward of Fu tau runs westward 1,600 yards from the northern end of that island and forms a hole with depths of 5 to 11 fathoms.

Red rock is 34 feet high, 200 yards in extent, and there are depths of 8 to 10 fathoms around it. The entrance to Loshan harbor is directly westward of the rock.

The harbor may be entered by the narrow channel northward of Fu tau, but the tidal streams at springs are probably rapid, and vessels can pass between Red rock and Fu tau where the depths are 13 to 20 fathoms; the main entrance is between Fort point and Fu tau. Red rock open of Fu tau avoids the deep hole, although it affords good and secure anchorage with the narrow channel open to the eastward. The junks lie northward of the deep hole in 2 to 3 fathoms; good holding ground.

Coast.—The coast from Loshan harbor to Maitau first trends westward for about 2½ miles and then southwestward for about 3 miles to Maitau, an island 125 feet high just off the point of the mainland and surrounded by reefs.

Chitau island (Chuensisan) lies about 4½ miles west-southwestward of Loshan harbor, ¾ mile off shore; is about 15 feet high.

Anchorage.—There is anchorage, sheltered from northeasterly gales, in 8 to 10 fathoms, mud, anywhere off the coast between Kyauchau bay and Loshan harbor.

Kiauchou Bay approach, Chalientau.—A small island 28 miles, 106° from the entrance to Kiauchou bay, in Lat. 35° 54′ N., Long. 120° 52′ 30″ E. The island is 1 mile long northeast and southwest, and very narrow; at its center is a small even-topped hill, 182 feet high, and its eastern end is a detached bluff.

Broken and discolored water has been observed to extend about ½ mile southwestward from the southwestern point of the island.

In spring and early summer dense fogs hang about this island, even when the coast is perfectly free from them; caution, therefore, is necessary, especially at springs when the tidal streams are strong.

Light.—A flashing white light every 5 seconds and visible 21 miles is exhibted from a gray sandstone tower, 49 feet high and 262 above high water, and is located on a small even-topped hill on the center of the island of Chalientau.

Fog signal is an explosive giving 1 report every 10 seconds.

Siaukung tau is a small square flat rock, 133 feet high, lying 13 miles, 98°, from the entrance to Kiauchou bay. It is apparently steep-to on all sides.

Taikung tau, which lies 115°, 10 miles from the entrance to Kiauchou bay, is of smooth, rounded outline, 415 feet high, and from all directions resembles a haycock. Tupfen islet, round and 103 feet high, lies 800 yards west-northwestward of Taikung tau; and 1,200 yards west-southwestward of Tupfen is Taikung tau reef, which covers at high water, and at other times of tides is partly dry and partly awash. Taikung tau should be given a berth of 2 miles when passing westward of it.

Taikung tau reef—Buoy.—A black bell buoy has been moored about 600 yards to the southwestward of the reef.

Light.—A fixed red light visible 4 miles is exhibited from a black cylindrical iron tower, 26 feet high and 421 feet above high water, erected on the summit of Taikung tau.

Swallow bank, about 3 miles southeastward from the middle of the entrance to Kiauchou bay, is nearly 1 mile long northwest and southeast and about 800 yards wide, and has a least depth of 4 fathoms. The summit of Shishan in line with cape Evelyn, 279°, leads northward of the bank; and the highest and northern summit of Chipo san in line with Pile point, 301°, leads southward of the bank and northward of Dangerous rock.

Iltis peninsula—Fog signal.—During thick or foggy weather a provisional explosive fog signal on the southern point of the peninsula gives one report every 10 minutes, and while a vessel's underway fog signal is heard; the reports are given every 5 minutes. The explosive fog signal will be made only when the North shoals whistle buoy is not in position or is out of repair.

North shoals, on which there are depths of $3\frac{3}{4}$ to 5 fathoms, extend from half a mile to $1\frac{8}{10}$ miles east-southeastward of Iltis peninsula, on the western side of Fushan so bay.

Fushan so town is on the northern side of Fushan so bay.

North shoals—Whistle buoy.—The red spar buoy, moored on the southern edge of North shoals, has been replaced by a whistle buoy painted red and marked $\overset{\text{“N F”}}{\text{S}}$

Tsingtau bay, with its harbor, is the central of the three small bays between Yunuisan and Huichuen point, on the northern side of the entrance to Kiauchou bay.

Arkona island, which is small and surrounded by reefs, lies in front of the eastern part of the bay, and protects vessels there from southerly winds, to which the western part of the bay is quite open.

The greatest depth in Tsingtau bay is about 16 to 20 feet; vessels of any size anchor off it. Several mooring buoys have been placed in the eastern part of the bay in depths of 5 to 12 feet.

Light.—The intermittent red light on Arkona island has been temporarily replaced (1908) by two vertical green lights 10 feet apart. The lights illuminate an arc of 180° from Iltis point through north and east and are visible 2 miles; the upper light is 79 feet above high water.

Pier.—A well-built pier, the inner part of stone, the outer part on iron piles, extends 400 yards from the head of the bay and is 24 feet wide; it has a depth of 12 feet at its outer end at low water, and landing is effected by a ladder. Boats using this landing should pass westward of the red buoy off the western end of Arkona island.

A small fixed light with red and green sectors is exhibited at the outer end of the pier.

There is another pier in the bay, but both are used only for launches and boats.

Buoy.—A red spar buoy has been moored in a depth of 3 fathoms off the southern edge of the reef extending from the western point of Tsingtau bay.

Prohibited anchorage.—Telegraph cables are landed in Auguste Victoria bay, eastward of Tsingtau bay. Two white wooden beacons, each carrying a square-shaped top mark, have been erected on the western shore of the bay, and 2 beacons with triangular-shaped top marks have been erected on the eastern shore of the bay Vessels must not anchor southward of the eastern beacons while eastward of the line of the western beacons.

Tsingtau, the chief port in German territory and the seat of the government, is situated on the promontory between the eastern side of Kiauchou bay and Tsingtau bay; it was formerly a poor fishing village, but it is now being rapidly transformed into a beautiful modern city; fine wide streets have been blasted out of the rock; commodious houses, fine hotels, offices, and workshops are springing up; electric lighting, telephone, waterworks, and afforestation are being pushed forward. The former Chinese inhabitants have been moved to a neat town, with wide streets and proper drainage, in the vicinity of the inner northern harbor.

Supplies.—At Tsingtau, beef and mutton, fish, poultry, eggs, vegetables, and fruit are procurable. Pork raised in the district is not eatable by Europeans. Food supplies can also be obtained at Nuko and Taputo.

Water is being brought into Tsingtau from the hills, and coal, at present only in small quantity, from the Weihsien coal fields.

Floating dock.—The new floating dock is large enough to dock a 12,000-ton ship and is now in use. It is 489 feet long, 85 feet wide, and 29½ feet deep. The dock is supplied with electricity, which is arranged to light up vessels for work at night, both inside and outside.

Repairs.—The workshops are capable of executing work of all kinds. There are two 20-ton cranes, and a giant crane capable of lifting 150 tons at a distance of 45 feet.

Time signal.—The time ball is now situated in Lat. 36° 4′ 12″ N., Long. 120° 19′ 07″ E. The time ball, which is black, is dropped from a mast surmounting a gray structure with red platform, elevated 272 feet above high water. The ball is hoisted half mast at 5 minutes before noon, close up at 2 minutes before, and dropped at 0h. 0m. 0s. standard time, or 16h. 00m. 00s. Greenwich mean time, corresponding to 0h. 1m. 15.17s. local mean time.

Should the signal be incorrect a red ball will be hoisted within 5 minutes on the staging and kept up for 5 minutes. In the case of the signal failing altogether, the red ball is hoisted halfway up within 5 minutes after the time of falling, and remains in this position until the time ball has been dropped.

Storm signals, similar to those in use at the signal stations of the imperial maritime customs, are made from the time-ball structure.

Signal station—Light.—A fixed white lantern light, elevated 329 feet above high water, and visible from a distance of 9 miles, is shown from the signal mast on Diederichs hill. It is visible from the bearing of 176° to 266° over an arc of 270°.

Wireless telegraph.—A wireless telegraph station for public use has been established at the signal station on Diederichs hill. The call signal is K. T. S.

Hospital.—There is a hospital with 156 beds at Tsingtau, and also a well-frequented sailors' home.

Trade.—Kiauchou custom-house, which controls the commerce of the territory around Kiauchou bay and the neighboring ports, was opened in 1899, its head office being established at Tsingtau.

Tsingtau is a free port. The free port now comprises the harbor only.

The principal articles of foreign goods imported are cotton and woolen goods, metals, coal, dyes, matches, kerosene oil, and sugar; and of native produce, beans, chinaware, cotton, jute, maize, matting, paper, rice, silk goods, sugar, timber, and wheat. The exports are chiefly beans, cabbages, felt caps, ground-nut cake, bean oil, ground-nut oil, salted pigs, melon seeds, straw braid, vermicelli, and walnuts.

The present system of lightering vessels in the open roadstead causes great delay and risk.

Coal of reported good quality has been found at Weihsien and Poshan, and it (with it is expected also iron, copper, and other ore) is now brought by railway to Tsingtau.

Communication.—A railway is completed from Tsingtau, via Kiauchou and Weihsien, to Tsinanfu, the chief town in the province of Shantung, with a branch line to Poshan; it is open to Tsinchufu. Weihsien is a city with 150,000 inhabitants and a very considerable depot for foreign trade. There is telegraphic communication with the universal telegraph system and telephonic communication with the principal German posts. Telegraph cables are laid to Shanghai and Chifu.

A courier service is maintained by the imperial Chinese post-office connecting Tsingtau with the principal cities inland, 3 or 5 times a week.

The Hamburg-American subsidized line of steam vessels runs a vessel every 4 to 6 days from Shanghai, via Tsingtau and Chifu, to Tientsin and back, in connection with the large steam vessels from Shanghai. The other lines using the port are the Butterfield and Swire Company, the Hamburg-American, and the Russian Steam Navigation in the East Company. The China Navigation Company's vessels call weekly.

Climate.—The climate is said to be exceedingly fine; in 1900, the maximum temperature during summer was 90.7° F., there being a cool breeze at night; the minimum temperature in winter was 12.2°; the winters are cold and bright.

Pilots.—The harbor master of Tsingtau supplies harbor pilots, and indicates to vessels arriving where they are to anchor.

Merchant vessels of over 100 tons may not anchor near, enter, or leave the Commercial, or Small, harbor in Kiau chou bay without a pilot.

The pilot will take charge at the entrance to the bay when approximately on a line joining Huichuen point and cape Evelyn (Jaeschke).

A pilotage certificate may be granted to the masters of vessels engaged in the regular trade with Tsingtau.

When a vessel is in charge of a pilot the local pilot flag is to be hoisted.

Tugs.—Steam tugs, which are used for the harbor works, and also a steam launch, are available if required.

Kiau Chou bay is of circular shape, some 13 miles across, and it affords roomy and well-protected anchorage for vessels of all sizes.

The anchorages suitable for vessels of deep draft are confined to the southeastern portion of the bay, into which Tsingtau promontory stretches in a southwesterly direction, and affords shelter from northerly winds on its southern and from southerly winds on its northern side.

The bay is partially frozen over during severe winters, which set in at the beginning of December and end about March, and the inhabitants say that the ice is then firm enough to walk across from Yintau, at the northern part of the bay, to Chiposan, within the entrance.

Five streams enter the bay, but none are navigable.

The general appearance of the land about the bay is barren in the extreme, and the dry, parched soil, which is yellowish clay interspersed with occasional blocks of granite, has a most uninviting appearance.

The entrance, 1¾ miles wide, is between the bluff of cape Jaeschke (cape Evelyn) on the south and the low Tsingtau promontory terminating in Yunuisan, a grassy island 30 feet high, which lies southward of its western extremity and is connected to it by a reef on the north. Immediately within cape Jaeschke (cape Evelyn) is Titungshan, a hill 518 feet high.

The northwestern and northern parts of the bay have no distinguishing feature, and the almost level land, about 180 feet high, is fronted by extensive mud flats, which dry out for over 3 miles from the shore.

Yunuisan light, a fixed and flashing white light with intermittent white sectors, thus: Flash 1 second, eclipse 1 second, from 252° to 282°, fixed white from 282° to 294°, 2 flashes in quick succession every 6 seconds from 294° through 0° and 90° to 179°, fixed white from 179° to 184°, 2 flashes in quick succession every 6 seconds from 184° to 212°, and obscured from 212° to 252°, and visible 17 miles, is exhibited from a circular iron tower painted red and white in horizontal bands, 108 feet high and 108 feet above high water, and located on the southwestern extremity of Yunuisan island.

Fog-signal.—A fog bell has been established at Yunuisan lighthouse, which is struck during thick or foggy weather when the fog-signals of a passing vessel are heard.

Whistle-buoy.—A whistle-buoy, painted red and marked "Junuisan," has been moored to the southward of Yunuisan, in a position from which the light-house bears 326°, distant 500 yards. Vessels must pass outside this buoy.

Horseshoe rock (Hufeisen reef) is ½ mile distant from the eastern shore of the bay; it covers at 5 feet rise of tide.

Beacon.—On a concrete block at about 400 yards southeastward of the northwestern extreme of Horseshoe rock is a white beacon with a drum-shaped topmark. This beacon is to be replaced by a light beacon.

Buoys.—A white buoy with a double triangular cage topmark, the points of the triangles being away from each other, is moored on the southeastern end of Horseshoe rock.

A white buoy with a double triangular cage topmark, the points being together, is moored on the northwestern end of Horseshoe rock.

A white buoy with a double triangular cage topmark, the points being upward, is moored on the northeastern end of Horseshoe reef.

Barkass rock, southeastward of the Horseshoe, is marked by a conical-shaped gray granite beacon, with a ball topmark.

Light.—An intermittent red and white light every 6 seconds, thus: Light 5 seconds, eclipse 1 second, and visible 5 miles, is exhibited from a round tower 52 feet high, painted green and white in horizontal bands, with the letters H. R. in white, 40 feet above the sea and located on Horseshoe rock.

It shows red from 137° to 157° over an arc of 20°, and white elsewhere.

Commercial harbor.—A breakwater runs southwestward and southward from Womans island; all inside this is being dredged out to a depth of 5½ fathoms, forming a harbor which will be sufficiently advanced for seagoing vessels of large draft to go alongside the wharves.

A smaller harbor for small craft to the southwestward of the large harbor is nearly completed, and has been dredged to a depth of 16½ feet. There is a pier in this harbor with a berth for a steamer on each side in a depth of 16½ feet.

The outer mole on the southern side of the harbor is known as No. 1 mole, and the mole eastward of it as No. 2.

Lights.—Two iron framework beacons, colored red, and each surmounted by a red and white cage, have been erected in the harbor. The front beacon is situated on the northern angle of No. 2 mole, and the rear beacon on the quay at a distance of 1,200 yards, 74° from the front beacon. At night each exhibits a fixed orange-colored light. These beacons in line bearing 74° lead through the center of the dredged channel into the harbor.

A fixed red light is shown from the end on the breakwater on the northern side of the entrance to the harbor, and a fixed green light from the western extremity of No. 1 mole, on the southern side of the entrance. These lights are visible from a distance of 4 miles.

Fog signal.—A fog bell, which is struck during thick or foggy weather, is situated on No. 1 mole.

Buoys.—The channel into Commercial harbor is marked on the northern side by two black conical buoys, marked $\frac{\text{“HE”}}{2}$ and $\frac{\text{“HE”}}{4}$ respectively; and on the southern side by two red spar buoys, marked $\frac{\text{“HE”}}{1}$ and $\frac{\text{“HE”}}{3}$ respectively.

Pier.—There is a pier on the northern side of Tsingtau promontory southwestward of the smaller harbor. In approaching it in boats keep two beacons with triangular-shaped top marks and red lights at night in line until two beacons with a square or recumbent cross as top mark and green lights at night within the pier are in line, which leads in. On account of the reef and sunken rocks these marks must be closely followed.

Mooring buoy.—A mooring buoy for vessels of the German navy lies southward of Horseshoe rock in 9 fathoms.

Tapau tau rock, northeastward of the Horseshoe, dries 5 feet, and is marked by a quadrangular pyramidical gray granite beacon, 30 feet high.

Womans island, on the same side of the bay, is 15 feet high; its northern and western sides are fringed with rocks which dry at low water, and it is connected with the mainland by an extensive mud flat. At 600 yards southwestward of the island is a rock which covers at 10 feet rise of tide.

Yintau (Potato island), in the northern part of the bay, is about 4 miles in length east and west, and the same north and south, being highest near the middle, which is about 200 feet high. Its southeastern part is the Tinggesan promontory, the summit of which is 176 feet high. This island is connected with the main to the northward by a mud flat which is usually dry.

Nuku ko, in the northeastern corner of the bay at the mouth of the Paishaho, and Tsangko, about 5 miles southward of it, are the junk ports for the city of Chimo, situated about 10 miles within the small river, Nanta ho, which runs into the north of the eastern arm of the bay.

Ta pu to, the junk port or landing place of Kiau chou city, consists of a large number of commodious warehouses for storing cargo, which is all shipped or landed here. The channel to Ta pu to is shallow, intricate, and its upper part is only navigable at high water.

It is marked by perches, which are left 50 to 70 feet on the port hand, entering.

Kiau chou, the local name of which is Chin chu fu, stands about 5 miles northwestward of the bay on a small river, at the entrance to which is Taputo village. It was formerly the principal emporium in the eastern part of Shantung.

Middle ground.—A shoal of 3¾ fathoms, about 200 yards wide, lies 1 mile northeastward of Chiposan.

Buoy.—A red and black vertically striped buoy, with a cylindrical cage top mark, is moored on the Middle ground.

Chiposan island, 3 miles west-northwestward of cape Jaeschke (cape Evelyn), is 2½ miles long north-northeast and south-southwest, with an average breadth of ¾ mile. There are several extensive villages on it, and its northern and highest hill is 177 feet high. The island is connected with the mainland to the westward by a flat, which dries and over which there are well-trodden routes at low water.

Observation spot.—The observation spot is situated in Lat. 36° 03′ 09″ N., Long. 120° 13′ 12″ E.

Bay rock, 1¾ miles from cape Jaeschke (cape Evelyn), covers at 3 feet rise of tide. Taikungtau, well open of cape Evelyn, leads northward of the rock.

Buoy.—A black buoy, with a double triangular cage top mark, with the points of the triangles upward, is moored about 100 yards northward of Bay rock.

Buoys.—The bay is also marked by the following buoys:

No. 2, black buoy on the western side of the bay and northwestward of Chiposan, in 10 fathoms.

No. 3, black buoy on the western side of the bay northward of Chiposan, in 11 fathoms.

No. 4, black buoy on the northwestern side of the deep water in the bay, in 6½ fathoms.

C, red spar buoy, with a diamond-shaped cage, on the northern side of the deep water in the bay, in 5½ fathoms.

B, red spar buoy, with a triangular-shaped cage, on the northeastern side of the deep water in the bay, in 6½ fathoms.

A, red and black horizontally striped buoy, surmounted by a cross, at the southern extreme of the shoal water extending from Yintau, and in the southwestern part of Nukuko fairway, in 6½ fathoms.

$\frac{\text{A}}{\text{A}}$, red spar buoy, on the eastern side of Nukuko fairway, in 5½ fathoms.

I^{A}, black buoy, on the western side of Nukuko fairway, in 6½ fathoms.

$\frac{B}{B}$, red spar buoy, at the northern end of Nukuko fairway, in 5½ fathoms.

NOTE.—From December to February the buoys in Kiau chou bay are removed owing to drift ice.

A shoal on the western side of Tsang koer deep (Nukoko fairway), formed by the deposit of spoil from the harbor works, is marked by a spar beacon with broom as top mark, erected in a depth of 2 feet at low water, at a distance of 3$\frac{3}{10}$ miles, 8° from Yunuisan light.

A red spar buoy, marked "C/C," has been moored on the eastern side of Tsang koer deep in a depth of 3½ fathoms, at a distance of 1$\frac{3}{10}$ miles to the northward of spar buoy B/B.

A black spar buoy, with ball as top mark, has been moored in a depth of 3¼ fathoms at the northern end of Tsang koer deep, at a distance of 1¾ miles from red spar buoy C/C.

NOTE.—The following buoys remain in position during the winter: Buoy A; No. 1 (Bay rock) buoy; No. 2 buoy; Middle ground buoy; and the buoys marking Horseshoe (Hufeisen) reef.

Tides and tidal streams.—It is high water, full and change, in Kiau chou bay at 5h. 0m.; springs rise 12½ feet, neaps 9 feet.

The turn of the streams takes place at high and low water on the shore very regularly, both inside the harbor and at the entrance. The direction of the flood is generally toward the mouth of the bay, and the rate 1 to 2 knots, increasing to 3 and 4 knots near the entrance, after which the rate much diminishes; the ebb runs the opposite way. There are tide ripples off Pile point, to the eastward of cape Evelyn, and also off Yunuisan, the north entrance point.

Anchorages.—The outer roadstead lies between a line from Pile point to Huichuen point on the east and a line from cape Evelyn to Yunuisan on the west.

The inner roadstead joins the outer roadstead and extends to the line joining Chiposan and Womans island.

Men-of-war anchor in the outer roadstead off Tsingtau bay and in the inner roadstead southwestward of Horseshoe rock, as convenient.

The first anchorage where junks resort is in Tsingtau bay. Small vessels anchor among the junks, and vessels of large draft in 8 or 9 fathoms, mud, with Arkona island bearing about 18°, 600 yards.

The bay on the southern side within the entrance, between cape Evelyn and Chiposan island, affords excellent shelter from winds between east, through south, and northwest. Bay rock must be avoided and also the wreck of a coal hulk lying 1,600 yards south-southeastward of it. Siotsushan, 359 feet high, is within a point which extends northeastward and divides this bay into two, both affording good anchorage for small vessels in 2 to 3 fathoms. In the eastern of these bays is Junk rock, which covers at 8 feet rise; it lies ¾ mile southeastward of the extreme point of Siotsushan and 800 yards off the middle point of the bay, between which and the rock is a passage of 2 fathoms.

The chart is the best guide to the other anchorages in the bay.

Dangerous rock (Kutsi yang), 135° 1⅗ miles from Pile point, is just covered at high-water springs and has deep water around it.

Hai hsi reef, 1,800 yards west-southwestward of Dangerous rock and ½ mile offshore, dries 5 feet. Between Dangerous rock and Hai hsi reef there is a passage of 9 to 13 fathoms, with Pile point bearing 334°, but it is more prudent to keep eastward of Dangerous rock.

Beacon.—A beacon marking dangerous rock consists of a circular stone pillar 26 feet high, painted white, with two horizontal black bands, each about 3 feet wide, and surmounted by a black cylindrical top mark, the top of which is 53 feet above low-water springs.

The letters K. Y are painted in black on the white surface on two sides.

Chucha tau, about 4 miles southward of the western entrance point of Kiau chou and 1½ miles offshore, is 800 yards long, north and south, about 400 yards wide, and 179 feet high, with a level top; it is inhabited. Pinliu tau (Round island) is ¼ mile eastward of Chucha tau, with which it is connected at low water; this island is about 300 yards across, 170 feet high, and conspicuous. At 400 and 600 yards eastward of Pinliu tau are two low islets named Lien tau.

Hai hsi shoal, with a depth of 3½ fathoms over it, lies 276° 1$\frac{4}{10}$ miles from the northern end of Chucha tau; and a shoal head, with 4½ fathoms over it, lies 175 yards southeastward of it.

Princess rock, with less than 6 feet of water over it, lies about 1¼ miles offshore, and 243° 5 miles from Chucha tau.

Coast.—From cape Evelyn (Jaeschke) the coast trends southwestward 10 miles to Kaiser point, and is bordered by reefs.

Arkona bay, of which Kaiser point is the western entrance, runs 4 miles northeastward within the southern part of the peninsula; possibly it is used by junks. Lingshanwei, on its western side, is a place of considerable commercial importance.

Telosan, an island 2½ miles in extent north and south, lying about 180° 6 miles from Kaiser point, is mountainous; its southern part rises 1,663 feet above the sea and is precipitous, whence it slopes toward its northern point, off which is a small low island.

Coast.—From Kaiser point the coast trends to the southward for 13 miles to Pearl cape, where the Tachu shan spur of hills, 1,600 feet high, extend to the cape; to the westward of the cape is Kuchen kou, a small shallow bay.

Langyi tau.—Langyi tau lies 6 miles southward of Peare cape and 1 mile off the shore and has an apparently broad channel inside it. but the island is said to be connected with the main by a spit, which extends from the low northern part of the island; the southern part of the island is a bluff, 230 feet high.

Wangkai bay lies about 12 miles southwestward of Langyi tau. It is long, narrow, and very shallow; its shores are low and rocky, with long projecting reefs. The bay affords shelter from northerly and northeasterly winds in 3 to 5 fathoms, mud; but even in 2 fathoms, which is outside where the junks lie, it is open from southeast to southwest. The junkmen considered the anchorage safe in December.

Lungwang temple, on the shore of the bay, is in Lat. 35° 39′ N., Long. 119° 48′ E.

Tides.—It is high water, full and change, in Wangkia bay, at about 6h. 0m.; springs rise 12 feet, neaps 9 feet. The stream during the falling tide sets northeastward along the coast, and probably during the rising tide it sets southwestward along the coast.

Tower point, which lies about 10 miles to the southward of Wangkai bay, was so named from a tower on it, which is now in ruins and not visible from seaward; it is low and rocky, and two reefs extend off it, but at the distance of 1 mile there is a depth of 7 fathoms. At 4 miles southwestward of the point are some earth cliffs, probably the Shan nan tau (Hill South head), lying under a sharp hill which has a tower on its eastern spur; off these cliffs an extensive reef dries out 1 mile, and shoal ground, 5½ fathoms, rock, was passed over at 2½ miles from the land.

Observation point (Saddle hill) lies 18 miles south-southwestward of Tower point; the coast between these two points has only been partially surveyed and caution should be observed inside the 5-fathom line.

Cha shan, a small island 197 feet high, lies 83° 23 miles from Observation point.

Ping tau (Flat island) lies 100° 22 miles from Observation point. It is about 1 mile in extent and 100 to 200 feet high, with a flat, rugged top and abrupt sides.

Tsin shan, a cluster of rocks, lying 105° 18 miles from Observation point.

Fogs.—The islands Tsin shan, Ping tau, and Cha shan are very frequently enveloped in mist during the spring and early summer. Caution therefore is necessary, especially when the tidal streams are strong.

Yuchu (Yuntai shan), the northern part of which is in Lat. 34° 47′ N., Long. 119° 23′ E., is a promontory, 1,200 feet high, connected with the mainland by long sand flats. An island, about 820 feet high, lies off its northeastern side, with a junk passage between, and there is also a rock above water off the northern side of the promontory at 2½ miles westward of the island. The bay westward of the promontory is shallow and only fit for junks.

Haichou is a large town on the mainland abreast the promontory.

Tides.—It is high water, full and change, at Yuchu at 6h. 30m.; springs rise about 12 feet.

Nainai shan, 331° 7 miles from the northern side of Yuchu promontory, is an island 197 feet high, and there is anchorage in 1½ to 4¼ fathoms northward of it.

The island is about ½ mile long in an east-northeast and west-southwest direction. From the western end a stony spit extends to a distance of about 1½ miles. Landing can be effected on a small patch of sandy beach on the southeastern side of Nainai shan; a ruined temple stands above this position. The northeastern side of the island is steep-to.

Lien tao is the name of the island extending along the northeastern side of Yuchu promontory. At each end of the island is a small rocky islet connected with it at low water.

Anchorages.—There is no sheltered anchorage, for a vessel drawing 15 feet or over, in the bay northwestward of Yuchu promontory.

The approaches to the bay are full of fishing nets, the floats of which come to the surface at slack water, and boats will then be found hauling and relaying them. If possible, therefore, avoid slack water for making the anchorage.

Small craft can anchor to the southwest of Nainai shan, where they are somewhat sheltered by the island and by a stony spit which extends like a breakwater for 1½ miles to the westward of it. This is the native anchorage for Ch'ing k'ou.

Chu p'eng kou.—At high water the entrance to the river is marked by breakers on each side. Junks drawing 6 or 8 feet of water can reach the village of Chu p'eng kou at high tide, but wide stretches of sand and mud separate it from the sea at low water, there being then only a few inches of water in the river.

Hsiaho kou, about 4 miles to the southward of Chu p'eng kou, can be reached, it is said, by seagoing junks drawing 9 feet of water. Ching kou, a small walled city, lies about 4 miles inland from Hsiaho kou.

Haichou, a walled city, lies at the foot of a short irregular range of hills named K'ung wang shan, the highest peak of which is estimated to be about 1,100 feet in height. It is an administrative center of some importance.

Hsinpuo, the port of Haichou, is reached from the sea by means of a canal or river about 9 or 10 miles in length. The tide runs with considerable force, and the shallowest part is the bar at the entrance, which can be crossed at high water by junks drawing at least 8 feet. It is much frequented at all seasons by large numbers of native craft. The trade, which appears to be considerable, is chiefly in fish, grain, and other food stuffs. Haichou is about 3 miles distant by road from Hsinpuo.

Coast.—From the Yuchu promontory to northwestward of the Yangtze river, a distance of about 240 miles, the coast is low and is intersected by numerous streams.

Ta sha (Great Sand Bank) stretches 80 to 90 miles off the former entrance of the Yellow river, with a width of probably 30 miles. On its northeastern extreme, in Lat. 34° 24′ N., Long. 121° 40′ E., there is a depth of 5 fathoms, and at 22 miles south-southeastward of that position a depth of 7 fathoms. The junks are said to ground frequently on this bank, through which there may be channels, but junks making passages always pass well outside it. There are probably channels near the land.

Shoal banks.—The whole of this coast is fronted by extensive flats and shoal banks, projecting in some places nearly 80 miles from the land and rendering approach dangerous, although there may be channels among the banks in the vicinity of the coast used by junks. The banks lie westward of the meridian of 122° E., except off the entrances of the Yangtze.

Socotra rock, in Lat. 32° 7′ 22″ N. Long. 125° 11′ 16″ E., is a coral patch over volcanic rock, which extends about ¼ mile northeast and southwest and is about 60 yards wide, with a depth of probably less than 18 feet over it. There are depths of 27 to 30 fathoms at ¼ mile around the patch, excepting southwestward, where a rocky ledge with a least depth of 17 fathoms extends ½ mile. The rock is very steep on its southern and eastern sides.

The tidal stream sets strongly over the patch, on which there are overfalls and tide rips; the sea sometimes breaks on the rock. Possibly, with a favorable light, the greenish color of the water over the rock might be seen, but only from a very short distance.

Tidal streams.—The tidal streams when near the edge of the shoals extending northward from the Yangtze river are rotary and run with considerable velocity at springs. They follow much the same laws as to direction as the streams off the mouth of the Yangtze.

Great care is necessary to consider their set when shaping course to pass near the edge of the shoals or in closing Shaweishan island in thick weather. In approaching Shaweishan from the northward the light should not be allowed to bear to southward of 203° until within 1 mile of the island.

Great Yangtze bank extends off the northern entrances of the Yangtze river to about 73° 125 miles from Shaweishan island; its breadth varies from about 30 miles at its western part to 10 miles near its extreme. The bank is gray or dark speckled fine sand, with a depth over it of 13 to 20 fathoms; the bottom near the bank is chiefly mud or mud and sand. A gully 25 to 30 fathoms deep runs northwestward into the bank and terminates at about 97° 25 miles from Shaweishan island.

Hwang hai, or Yellow sea, lies northward of the Tung hai, and between the coast of China from the Yangtze to Shantung promontory and the coast of Korea, the coast of the Manchurian province of Shingking from Liaotishan to the Yalu river forming its northern shore.

CHAPTER IV.

YANGTZE RIVER.

Navigability.—The banks and channels in the Yangtze and its entrance are constantly changing.

According to the latest information, there is a depth of 19 to 20 feet water at lowest low-water springs on the outer bar of the Yangtze, and 16 feet over the Fairy flats, which are southeastward of the Middle ground. The rise of tide on this bar and these flats is generally 10 feet at neaps, and from 14 to 15½ feet at springs; with these rises the South channel can be navigated by vessels of 26 feet and 30 feet draft, respectively. But the winds here affect the tides so much that the amount of the rise can not possibly be relied on.

The depth on Wusung outer bar is at present 11 feet at low-water springs, or about 23 feet at high-water springs, and 19 feet at high-water neaps; that on the inner bar varies from 8 to 13 feet at low-water springs, as this bar silts up and deepens at seasons. Usually Shanghai can be reached by vessels drawing 16 to 17 feet at autumn neaps and 20 to 21 feet at autumn springs, 20 to 21 feet at spring neaps, and 24 to 25 feet at spring springs.

Vessels of 27 feet draft can reach Nanking at all seasons.

Vessels of 27 feet draft can reach Wuhu in summer, and of 16 feet draft in winter. Kiukiang can be reached by vessels of 27 feet draft from June to October, but in winter vessels of 11 feet draft would at times have difficulty in reaching this city, although Hukau, at the entrance of Poyang lake, can be reached by vessels drawing 14 feet.

Hankow is reached by vessels drawing 27 feet in summer, or from about the middle to the end of April to about the middle to the end of October, but the river can not be absolutely depended on until the beginning of June; and by vessels drawing 9 feet, sometimes with difficulty, in winter.

At low river vessels of 27 feet can reach Wade island, 40 miles below Wuhu, but here the river channel shoals to 19 feet; the next bar is 92 miles above Wuhu, at Tai ton chi, where the depth is 13 feet and the channel narrow. At Oliphant island, 12 miles below Kiu Kiang, there is about 10 feet. The next bar (10 feet) is at Hunter island, 20 miles above Kiu Kiang, and another at Gravener island, 30 miles below Hankow.

Yo chau is accessible to vessels of 20 feet draft, which could go no farther, at high river, and to vessels of 7 feet at low river.

The river between Hankow and Ichang is navigated by vessels drawing up to 14 feet in summer and to 6 feet in winter, but then sometimes with difficulty.

It is, however, to be understood that above Nanking the depths over the different bars vary much in different years, and that local knowledge is necessary to decide whether vessels of a given draft can proceed in safety anywhere above Wuhu.

The navigation above Ichang is difficult owing to rapids, strong current, etc., and although H. B. M. S. *Woodcock* and *Woodlark*, each 145 feet in length and drawing 2 feet to 2 feet 10 inches, have ascended the Yangtze to Chungking and Sui fu in May there are as yet no merchant steamers running above Ichang.

Sui fu has also been reached by H. B. M S. *Kinsha*, a paddle steamer, 180 feet in length, 30 feet in breadth, with a draft of 6½ feet and a speed of 14 knots, in August.

It is considered that the river above Ichang is unnavigable for steam vessels during the low-water season, and also that in the majority of seasons navigation would also be suspended during the greater part of July and August.

It seems advisable to remind the mariner that, in using the terms right and left bank of the river, the terms apply when descending the river; thus the right bank is that on the right or starboard hand when descending the river, and the converse when ascending.

Pilots.—Yangtze river pilot schooners, carrying their number on their sails and a flag, the upper half of which is white, the lower half red, at the masthead, either cruise or anchor in the vicinity of the fairway bell light buoy at the southern entrance to the Yangtze, but when a northwesterly gale is blowing or expected the vessels generally anchor inside Tungsha light-vessel. It sometimes happens in a northwesterly gale that the vessels are unable to fetch the lee of the Tungsha banks, when, if unable to hold their ground, they run either for the lee of Yangtze cape or the Saddle islands.

A pilot schooner with no pilots on board flies the International Code flag K (yellow and blue divided vertically).

It is not necessary for vessels to await the arrival of the pilot off the bell buoy at the entrance to the South channel should the pilot steamer, which lies farther in on the bar, show the pilot flag. In this case a vessel can approach the pilot steamer without danger and take the pilot on board. If this should be dangerous, the pilot steamer will not show the pilot flag, or will make the signal to anchor.

The foreign pilots form a company, named the Shanghai Licensed Pilots Association; the office is in Peking road, Shanghai, where pilots can be obtained. There are now no Chinese pilots. Sailing directions can not take the place of the utility of the pilots where so much depends upon a knowledge of the tides and tidal streams.

Experienced pilots for the Lower Yangtze can be obtained at Shanghai, or by previous arrangement at Wusung.

Lifeboats.—There are numerous lifeboat stations on the Yangtze river. The lifeboat houses are square whitewashed buildings with large black Chinese characters painted on the side facing the river.

Changes of the river.—Considerable alterations are constantly taking place at certain localities in the estuary of the river, which drains so vast a country and is subject to periodic inundations.

The Yangtze is in a state of almost constant change for 50 miles above Wusung river, especially at Langshan crossing, where the river opens out from a breadth of 4 to 9 miles, and vast flats and middle grounds form, which shift their positions; consequently no dependence can be placed on the plan as a navigational guide.

The essential features of the Yangtze, as regards navigation, alter so rapidly that a plan, unless constantly under correction, soon becomes valueless, and can not be considered a safe guide for certain localities.

In September and October the river is not difficult to navigate with proper care and caution, the water being then many feet higher than its winter level. In August or September it commences to fall, and in November and December sinks 8 or 10 inches a day, on account of which these two latter months are considered the most difficult period for navigation, for the bed of the river becomes altered by the summer inundations and rapid currents, so that if a vessel, having touched the ground, is not floated off at once, there is probability of her remaining aground until the water rises in the ensuing spring. It is therefore deemed imprudent to attempt the navigation of the river at this season without a pilot.

In the higher parts of the river, where its width becomes narrow and the current is strong, it is of consequence that vessels of small steam power should keep as close in to the river banks as possible, in which case the lead is a good and sufficient guide when going against stream; but in going down the river it is better to keep in mid-channel, whereby much risk is avoided and the current taken advantage of. Small steamers may take all the short cuts from June until the time the waters commence to fall.

Rise and fall of the river.—The Yangtze is subject to great periodic changes of level. The waters begin to rise in February or March and attain their highest level in July or August, at which season the higher portions of the river assume the appearance of an immense lake by the inundation of the low lands. No banks are visible; junks and boats of all descriptions sail over what on the chart is dry land. At many places between Nanking and Hankow the waters exceed 20 miles in breadth, and sometimes no land can be seen from the deck on either side as far as the bases of the distant hills.

The houses are under water, and for miles only the roofs and trees are visible, the inhabitants of the villages encamping on the hills till the waters recede. From about the end of August the waters recede gradually until the end of January, when the river is at its lowest level and at that to which the soundings on the plans refer. The winter levels vary about 3 feet; the summer levels have a greater range.

The height of the summer above the winter levels may be considered to be for Chinkiang 15 to 18 feet, Kiukiang 30 feet, and Hankow 40 to 50 feet. At Kiukiang the rise has been recorded as 21 feet between March and June; at Yochau 20 feet.

Tides and tidal streams.—It is high water, full and change, in the vicinity and eastward of Gutzlaff island at 11h. 30m.; springs rise about 15 feet. The highest tide occurs on the second day after full and change.

At Tungsha light vessel it is high water at 11h. 36m.; springs rise 14 feet, neaps 11 feet, and neaps range 8 feet.

The tide falls on an average for 7 hours both at springs and neaps, and rises for 5 hours.

The tidal streams off the mouth of the Yangtze are rotary and turn in a direction with the hands of a watch; the first half of the flood runs in directions from south to west, the last half from west to north; the first half of the ebb runs in directions from north to east, the last half from east to south.

The rate of the stream varies with the age of the moon between 1 and 4 knots an hour. Near land or in a locality where a strong wind has been blowing for some time in one direction or during freshets in the rivers the above rule may need modification, but as a broad guide to warn the mariner in what direction he may expect the stream to set him off his course or how it will assist or retard him in his progress toward the river it is useful.

The tidal streams from Gutzlaff island to Shaweishan perform one revolution in 12 hours, and there is reason to believe, although the fact has not yet been established, that they preserve the same character for some distance to seaward and far to the northward. The rotation has been observed when 120 miles northward of the entrance to the Yangtze at 70 miles from the land.

During its revolution the direction of the stream changes near Ariadne rocks about 20° every hour, excepting when turning from northwestward to north-northeastward soon after high water and from southeastward to south-southwestward soon after low water, when the change is more rapid. The western stream for the most part makes and completes the flood and the eastern stream for the most part makes and completes the ebb, though the first part of the flood is made by the southern stream and the first part of the ebb by the northern.

The set on the bank on the southern side of the river entrance, which occurs during the last hour of ebb and first hour of flood, must be guarded against when entering the Yangtze kiang. In strong northerly winds the southerly set at the first of the flood is frequently felt as far within the entrance as the Tungsha bank is covered.

At Tungsha light-vessel the ebb runs strongest during the fifth and sixth hours, and the greatest rate noted during springs was 5 knots and during neaps 3¼ knots; the flood runs strongest during the third and fourth hours, and the greatest rate noted during springs was 3 knots and during neaps 2 knots.

In the South channel the streams turn quickly, the flood stream making at 4h. 30m. before high water and the ebb 2 h. to 2h. 30m. after high water. There is very little slack water, the ebb running 7 hours at springs and traversing during that period a distance of 24 knots, the greatest rate of 5 knots an hour being attained during the fifth hour after high water. The flood runs 5 hours with much less strength, seldom exceeding a rate of 4 knots, the distance attained during the whole tide being 16 knots. On the change day, in a position well within the banks and influenced by the river streams, the ebb was observed to run 20 knots and the flood 10 knots on the whole tide.

Between Tungsha light-vessel and Wusung the tidal streams are considerably stronger in the navigable channel than to seaward, owing to the water being confined within narrower limits by the banks.

With the wind fresh from the southward, the ebb stream in the vicinity of the Tungsha light-vessel, and for a considerable distance farther eastward, sets northward of east much longer than under other circumstances; with a fresh northerly wind the opposite of this is the case.

Delta of the Yangtze, which is 70 miles wide from north to south and 60 miles in extent, is divided into two almost equal portions by the main stream of the river.

Tsungming island is about 37 miles long west-northwest and east-southeast, 5 to 10 miles broad, and contains a population of about half a million, although in the fourteenth century it was not above water. There is no large city on the island, but many agricultural settlements, with fishing villages along the coast. Numerous creeks run into the island.

Tungsha banks, lying southeastward of Tsungming island, form the southern portion of the delta.

The Yangtze enters the sea by three channels, two only of which are navigable.

North branch, situated northward of the northwestern part of Tsungming island, has a depth of 4 to 5 feet at low-water springs; it is but little known and is only available for junks.

Shaweishan or North channel has a depth of 19 feet over the Tsungming crossing, but this crossing is subject to rapid change.

South channel has 19 to 20 feet least water over the bar and 16 feet over the Fairy flats. It is the nearest and most convenient approach from the southward to Shanghai, which is situated on the Wusung river, a tributary of the Yangtze, flowing into South channel about 40 miles from the entrance.

Outer anchorage.—In fine weather there is anchorage anywhere between Gutzlaff island, Amherst rocks, and Saddle islands, one of which should be in sight in order to take a departure.

In a sailing ship do not anchor at night under the Saddle islands during the northeast monsoon unless there are appearances of bad weather, as it frequently takes all the daylight of the next day to work up to the entrance of the Yangtze.

In summer, if there are appearances of bad weather, which the barometer does not always foretell, do not attempt to run in unless certain of getting within the bar, but either anchor under the Saddle islands or keep at sea, standing off and on, as it is dangerous to enter the river when a gale is coming. It is preferable to anchor rather than to stand out to sea in order to keep the position, as the weather is sometimes thick and foggy and the tidal streams strong.

North entrance leads into the Yangtze northward of Tsungming island, where the river flows into the sea by the North branch. It is probable that the banks and channels in this locality have entirely changed since the last examination, and vessels should not approach it even in the finest weather under a depth of 8 fathoms.

Shaweishan or North channel lies between Shaweishan island and shoals, Drinkwater bank and Tsungming island to the northward and Tungsha banks and the shallows extending westward; thence to Middle and Tsungpaosha island, to the southward. In the middle of the channel, where there is the deepest water, the bottom is chifly mud, or mud and sand, while near the banks it is usually sand. The water shoals somewhat gradually on the northern side, but Tungsha banks are steep-to.

This channel has an approximate breadth of 3 miles, with a least dpth of 18 to 19 feet, from Shaweishan island to Drinkwater point buoy; its width then averages nearly 2 miles, with a depth of 3½ to 9 fathoms, to the Tsungming crossing, where the swashway is narrow, with 19 feet least water. This swashway is subject to rapid change.

Shaweishan island, which lies at the northern side of the entrance to the Shaweishan channel, is small, steep-sided, 196 feet high, and surmounted by a light-house. On a south-southwesterly bearing it makes as a flat-topped island, with the highest part to the eastward, on a westerly bearing as a peaked island, and on a northwesterly bearing, distant about 5 miles, it appears like two islands, the western being the smaller. It is seldom seen when entering the river from the southward.

Light.—An intermittent white light every 15 seconds—thus, light 13 seconds, eclipse 2 seconds—and visible 22 miles, is exhibited from a circular tower painted black, 55 feet high and 229 feet above high water, and located on the summit of Shaweishan island.

Fog signal.—When any sound indicates the proximity of a vessel 3 guns will be fired with an interval of 5 minutes between the first and second, and 1 minute between the second and third, and repeated after 15 minutes if the sounds are still heard.

The keeper's dwelling is painted white.

Tides.—It is high water, full and change, at Shaweishan island at 11h. 22m.; springs rise 14 feet, neaps 9¾ feet; neaps range 5¼ feet.

North channel.—Drinkwater point.—Light vessel.—A light vessel, exhibiting an intermittent white light every 10 seconds, thus: Light, 5 seconds; eclipse, 5 seconds; elevated 35 feet above the sea and visible from a distance of 11 miles, has been moored on the northern side of the channel at a distance of 3 miles to the southeastward of Drinkwater point.

The vessel is of iron, painted red, marked "Drinkwater point," and has an iron column surmounted by the lantern.

Should the light-vessel be out of position the light will not be exhibited, but a fixed red light will be shown from each end of the vessel at night and a red flag displayed by day.

Fog signal.—A bell is struck once every 15 seconds.

Drinkwater point buoy.—A light and bell buoy with a conical superstructure, painted black and red in horizontal stripes and showing an intermittent white light, thus: Light, 4 seconds; eclipse, 2 seconds; is moored with Shaweishan light-house bearing 83°, distant 12¼ miles.

Drinkwater point, on the northern side of Shaweishan channel, is low and covered with grass and reeds; it is protected by embankments, and there are numerous trees at about 1 mile inland. The southern side of Tsungming island, for about 6 miles westward of Drinkwater point, is fringed by a mud flat, which dries at low-water springs, named Chi yao bank, extending off in some places about 1½ miles and steep-to.

Beacon.—A wooden trestle beacon, 60 feet in height, surmounted by a black staff and ball, has been erected on Drinkwater point in the position formerly occupied by the light-house.

The chapel on the southeastern side of Tsungming island is located about 1 mile farther to the eastward than indicated on the chart.

Beacons.—On the southern coast of Tsungming island at the mouth of Chenghsiaochiang creek, about 5 miles west-northwestward of Liu chiao, is a wooden tripod beacon bearing a spherical cage.

Northwest beacon, on the southern coast of Tsungming island, at about 5¾ miles west-northwestward of Chenghsiaochiang, is an openwork wooden structure bearing a spherical cage.

Block house island is surrounded by an embankment and is thickly wooded and populated; it is the first land sighted on the southern side when entering Shaweishan channel. There is a beacon, a quadrangular, openwork, wooden structure, 50 feet high, painted white, and surmounted by a black ball near the southeastern extreme of the island.

Middle island lies about 1½ miles northwestward from Block house island; it is cultivated, well wooded, and intersected by creeks.

Near the eastern end of Middle island is a white, quadrangular, openwork, wood beacon 50 feet high, with black ball topmark.

A black buoy, with staff and black inverted frustum cage, is moored off the bank which lies northward of Middle and Block house islands.

Lightbuoy.—A lightbuoy, painted black, named "Middle island gas-buoy," has been moored at a distance of 1½ miles, 222°, from the site of Liu chiao beacon.

Chung pao sha, an island 2¾ miles west-northwestward of Block house island and about 2 miles northward of Wusung river entrance, is about 3 miles in length, 1,400 yards wide, and is inhabited and cultivated.

There is a sanitary station on the northwestern part of the island, and the quarantine beacon, an openwork structure of wood, surmounted by a pole and spherical cage, is about ½ mile to the southward.

Tsung ming crossing, northward of Chung pao sha, runs in a 257° direction, and is marked by East entrance (black) and West spit (black and red vertical stripes) light buoys, each showing an intermittent white light every 8 seconds, thus: Light, 4 seconds; eclipse, 4 seconds; and two black buoys at equal distances between them.

The First crossing buoy is surmounted by a black cylindrical cage, and the Second crossing buoy by a black triangular cage.

Directions.—When approaching Shaweishan from the northward, the light should not be brought to bear to the southward of 203°

until within 1 mile of the island, in order to avoid the shoal ground northward of it.

Shaweishan channel has at present a least depth of 19 feet at low water. It is only used by coasting steam vessels from the northward, and there are no pilots. In typhoon weather it is better to shelter under Drinkwater bank than to anchor outside or to proceed after dark for the South channel in strong tidal streams. Notice, however, that this locality is subject to frequent and considerable changes.

It is best to enter Shaweishan channel so as to have a rising tide and a fair stream until over the Tsungming crossing and slack water for mooring off Wusung.

In order to inform vessels approaching the bar the depth of water over it, a tide gauge has been established at Shaweishan island, and the height of the tide in feet above the soundings shown on the chart is signaled by International Code if requested.

As the tide gauge at Shaweishan is situated at some distance from the lighthouse, it may take about a quarter of an hour before a vessel's signal can be answered.

Pass 3 miles southward of Shaweishan island, and steer for Drinkwater point buoy, allowing for the tidal stream.

Leave Drinkwater point buoy 200 yards to the northward, then steer 267° west till Drinkwater point beacon bears 307°, when steer 281° and pass about 1,000 yards southward of Chi yao bank buoy. Then steer to leave Middle bank buoy and the Tsungming crossing buoys at about 200 yards on the port hand, when stand over toward the right bank of the Yangtze till in about mid-channel, whether bound up or down the river.

Caution.—Tsungming crossing swashway is subject to rapid change, and mariners should not use it without recent local knowledge.

Tidal streams in Shaweishan channel.—Caution is required between Shaweishan island and Drinkwater point, as the tidal streams are rotary and strong. The first of the flood stream sets southward, thence turning, through west, northward; and the first of the ebb sets northward, thence turning, through east, southward. The rate of the streams is generally strongest at the fourth hour of ebb and the third of flood, when it is usually 3 to 4½ knots at springs, but occasionally 5½ knots an hour. The tidal streams cease to be rotary westward of Drinkwater point in Shaweishan channel. The streams run across Tsungming crossing swashway, where the northwest-going stream must be specially guarded against.

Amherst rocks, 155° 16½ miles from Shaweishan island, are a cluster of dark rocks, of which the largest is 26 feet high and prominent, making as a single black rock; a detached rock, that dries 3 feet at low-water springs, lies 375 yards southward of the largest rock.

Numerous fishing boats are generally cruising in the vicinity, and fishing nets are laid out, which are indicated in daylight by the bamboo framework which floats them, but at night their avoidance would be almost impossible, and the locality should be given a wide berth.

Ariadne rocks lie 256° 6¾ miles from Amherst rocks, and the shoalest head is awash at low-water springs, with depths of 4 to 4¾ fathoms, muddy bottom, close around. Caution is necessary in the vicinity of these rocks, particularly during the north-going and west-going streams, for the lead is no guide.

Buoy.—A red and black checkered automatic whistle buoy is moored in 5 fathoms about 250 yards southward of the rock, which is awash at low water.

The tidal streams off Ariadne rocks are rotary; the flood, setting southward at its commencement and working northward through west, attains its greatest strength, 3½ knots an hour, between the third and fourth hours; and the ebb, working from north southward through east, runs between the third and fourth hours as much as 4 knots an hour.

Yangtze cape is 1 foot above high-water ordinary springs, and is formed by the alluvial deposit of the Yangtze kiang.

Northward of the cape the coast curves gradually round and trends north-northwestward to the right bank of the Yangtze river. Westward of the cape the general direction of the coast is about 263° for 8 miles.

Inside the high-water line, at about 1,800 yards from it, near the cape, there is an embankment 7 feet high, and northward it runs parallel to the coast, but westward it is less regular in direction, and at about 4 or 5 miles from Yangtze cape it approaches the coast closely, beyond which it turns inshore. Many mounds of mud, from 10 to 14 feet high, said by the natives to be graves, exist outside the embankment 6 miles westward of the cape. The ground here is very swampy. Inside the embankment there are numerous hamlets, and the land is well cultivated. There is a dense population.

The most conspicuous object near Yangtze cape is a joss house of moderate size, some little distance inside the embankment; it has four poles outside it, and the top of the house is about 14 feet above the sea.

Bell buoy.—A bell buoy, painted red, is moored close to the 5-fathom curve at the entrance to Hangchow bay, 281° 14½ miles from Gutzlaff light.

Tidal streams.—It is high water, full and change, at Yangtze cape about 11h. 30m. The tidal streams set parallel with the coast, the flood westward, ebb eastward. The flood stream begins soon after low water, and the ebb soon after high water. At springs the stream runs 6 knots, at neaps 3 knots; caution is necessary in anchoring.

The coast on the southern side of South channel from Yangtze cape to Wusung river is low and level, well wooded, cultivated, and partly embanked.

South bank.—The coast for 20 miles northward of cape Yangtze is fronted by an extensive mud bank which commences at the cape. Its eastern elbow, in 2 fathoms, is situated about 10 miles from the shore and 338° 11½ miles from Gutzlaff island. From this elbow the edge of the bank trends approximately 322° for 13½ miles and then, after making a curve to the southwest, it gradually approaches the shore. The bank is of very soft mud, and on its outer part there are generally large floating fishing stakes in long rows attached to nets.

South channel, which is the principal fairway into the river, is bounded to the southwestward by South bank and to the northeastward by the Tungsha banks and the shallows extending therefrom.

Tungsha banks, forming the northeastern side of South channel, are subject to considerable alteration, and the eastern portion of the banks is reported to be much changed since the last survey. Southeast spit extends within a depth of 3 fathoms east-southeastward nearly 5 miles from Tungsha light-vessel. There are depths on it of 4 to 16 feet, and it breaks heavily in northeasterly gales. The southwestern edge of the bank is steep-to and the bank forms a complete breakwater to South channel, which affords secure anchorage everywhere in ordinary weather. Tungsha light-vessel, bearing 302°, leads close southeastward of the spit.

False channel, between Southeast spit and the eastern portion of Tungsha banks, carries from 19 to 22 feet water for 6 or 7 miles northwestward until blocked by the bank. This false channel has been mistaken for the outer bar. No difference is discernable in the nature of the bottom in either channel nor are there any means of indicating the position in thick weather, when vessels should anchor, or, if blowing hard, stand to sea.

Outer bar.—The fairway over the outer bar has not less than 19 feet at low-water springs on its shallowest part.

Lights, beacons, and buoys.—South channel is now marked as follows, but the changes are so rapid that both light-vessels and buoys are frequently moved, and no reliance can be placed on either charts or sailing directions without recent information.

Fairway bell light buoy.—A bell light buoy with a conical superstructure, painted red and black in horizontal stripes, is moored in 22 feet in the fairway of the South channel approach, with Tungsha light-vessel 309°, distant 10⅞ miles.

The buoy shows an intermittent white light every 8 seconds, thus: Light, 4 seconds; eclipse, 4 seconds.

Tungsha light-vessel, painted red, with "Tungsha" in white letters on her sides, and having one mast surmounted by a black ball, is moored in 3½ fathoms in the South channel, and exhibits at 38 feet above the sea a group-flashing white light showing three flashes in quick succession every 45 seconds, visible from a distance of 11 miles.

The light-vessel is now moored on the north side of the channel and vessels should pass southward of her.

When the light is lowered for trimming, a small fixed white light is hoisted and a flash light burned. A small white riding light is hoisted on the forestay from sunset to sunrise.

If the light-vessel be driven from her station to a position where she is of no use as a guide to shipping, a fixed red light is shown at each end of the vessel. The group-flashing light is not exhibited. The ball will be struck, and until struck will be surmounted by a red flag.

A gun is fired when vessels are observed running into danger, and the course to be steered signaled by the International Code.

Fog signal.—Steam siren, giving a high and a low note, is sounded every 90 seconds. Should the siren be disabled, a gong is sounded every 90 seconds.

Kiutoan light-vessel exhibits an intermittent white light every 17 seconds, thus: Light, 12 seconds; eclipse, 5 seconds. It is elevated 30 feet above sea and visible 10 miles. The vessel is painted red, marked "Kiutoan" on the sides, and has one mast or column from which the light is exhibited.

A white riding light is shown from forward.

If the light-vessel is out of position, a red flag will be hoisted by day, and at night a fixed red light at each end of the vessel will be exhibited in the place of the occulting light.

The light-vessel is moored on the north side of the channel and vessels should pass southward of her.

Fog signal.—A bell will be struck twice every 20 seconds, thus: Stroke; silent interval, 5 seconds; stroke; silent intervals, 15 seconds.

Caution.—Tungsha and Kiutoan light-vessels have frequently been endangered by steam vessels passing recklessly near them; all vessels are cautioned against attempting to cross the bows of these light-vessels during the strength of the flood or ebb streams at a distance of less than ½ mile and not to pass them under any circumstances nearer than 150 yards.

Clump beacon, a pyramidal open-work wooden structure 70 feet high, is on the southern bank of the South channel southwestward of Kiutoan light-vessel. There is a dark cluster of trees near the beacon.

Kiutoan beacon, a quadrangular open-work wooden structure 50 feet high, is on the southern shore of South channel at about 6 miles north-northwestward of Clump beacon.

Nanhui beacon, a pyramidal framework structure, 90 feet in height, surmounted by a cone painted in black and white horizontal bands, is situated on the southern bank of the South channel at a distance of $6\frac{4}{10}$ miles 147° from Clump beacon.

Clump and Kiutoan beacons are each surmounted by a cone painted in black and white horizontal bands.

Kiutoan small beacon, a wooden tripod painted white, is situated on the southern shore of the South channel at about 5½ miles northwestward of Kiutoan beacon.

Light.—A white wooden mast, situated 44° 500 feet from Kiutoan small beacon, exhibits, at 40 feet above high water, a group intermittent white light every 30 seconds, thus: Light, 20 seconds; eclipse, 2 seconds; light, 2 seconds; eclipse, 2 seconds; light, 2 seconds; eclipse, 2 seconds; which should be seen from a distance of 10 miles in clear weather. The keepers' dwellings are painted white.

House island, on the northern side of the channel, is a low alluvial island, intersected by numerous creeks, and in process of reclamation. A pyramidal open-work wood beacon, named House Island beacon, 70 feet high, stands about ½ mile inland near the southwestern side of the island; and Southeast beacon, consisting of a spar surmounted with a spherical cage, stands on the southeastern part of the island.

There is good anchorage, in 4 to 6 fathoms, nearly a mile wide, well sheltered and with smooth water, off the southwestern side of House island.

House island beacon is surmounted by a cone, painted in black and white horizontal bands.

House island buoy, red spherical, moored in a depth of 17 feet, to mark the edge of the bank extending southeastward from House island, at a distance of 4 miles, 129° E., from House Island beacon.

House island crossing buoy, conical, painted in red and black vertical stripes, surmounted by a staff and black diamond, moored in a depth of 17 feet, to mark the crossing on to the Kiutoan flats, at a distance of $1\frac{3}{10}$ miles, 230°, from House Island beacon.

Middle ground lies parallel with the course of the river and nearly in mid-channel southwestward of House island, and a red and black vertically striped conical buoy, with a black cylindrical cage, is moored on the northwestern end of the Middle ground with House island beacon bearing 96°, distant 4⅘ miles.

Fairy wreck light and bell buoy, painted green and surmounted by a cone with " Wreck " on it in white letters, lies over the wreck of the *Fairy*, with House island beacon bearing 347°, about $4\frac{2}{10}$ miles. It shows an intermittent white light every 8 seconds, thus: Light, 4 seconds; eclipse, 4 seconds. The wreck of the *Fairy* has been removed to about the level of the surrounding bottom.

The shoalest water in South channel is on the Fairy flats, where the depth is about 16 feet at low water. These flats are said to be stiff mud and not to alter to any great extent.

Tungsha bank buoy, red conical, surmounted by a staff and black ball, moored in a depth of 25 feet at low water to the southeastward of the Tungsha banks, at a distance of 8¾ miles easterly from Tungsha light-vessel.

Tungsha buoy, red conical, surmounted by staff and black triangle moored in depth of 18 feet, to mark the southern edge of the Tungsha banks, at a distance of 8½ miles northwesterly from Tungsha bank buoy.

Kiutoan flats buoy, black conical, moored in a depth of 17 feet, to mark the northern edge of the Middle ground, at a distance of $2\frac{9}{10}$ miles, 263° from House island beacon.

Southeast knoll light buoy, with a red conical superstructure, lies southwestward of the Blockhouse shoal with Kiutoan small beacon bearing 263°, distant $2\frac{8}{10}$ miles. The buoy exhibits an intermittent white light every 8 seconds, thus: Light 4 seconds, eclipse 4 seconds.

Blockhouse shoal extends about 9½ miles southeastward of Blockhouse island, and it partly dries.

Trees.—On the southern shore of South channel, at about 2½ miles northwestward of Kiutoan small beacon, are two remarkable trees, known as High Double, which are visible from near Southeast knoll buoy; at 1 mile farther northwestward is a clump known as Scraggy tree.

Triplets trees, 1½ miles northwestward of Scraggy tree and half a mile inland, are a remarkable group of three, with a fourth tree attached which is not generally noticeable.

Blockhouse light buoy, painted red and surmounted by a red conical superstructure, is moored with Middle island beacon bearing 347°, distant $2\frac{7}{10}$ miles. The buoy shows an intermittent white light every 8 seconds, thus: Light 4 seconds, eclipse 4 seconds.

The Quarantine anchorage off Chung pao sha is now marked by two red buoys placed about 1½ miles apart, the western one, on the outer edge of a detached 3-fathom bank, is a light buoy, the eastern one is conical in shape and is unlighted. These buoys also mark the northern side of the channel.

Mail steamers and other large vessels arriving from infected ports may anchor, for the purpose of inspection by the health officer, in any clear berth to the northwestward of the line for crossing Wusung outer bar.

Yangtze approach, northward—Directions.—All vessels approaching the Yangtze from the northward or northeastward make Shaweishan and the Amherst rocks. These rocks, bearing 58° astern, lead nearly 2 miles southeastward of Ariadne rocks, which are marked by a red and black whistle buoy, and direct to the fairway bell light buoy. The tidal streams must be allowed for in shaping courses, and a ground log should be used when practicable; guard also against being set on the Tungsha banks. If misty or foggy weather prevents Shaweishan or the Amherst rocks being seen from a reasonable distance, vessels must anchor outside.

In northeasterly winds there is a probability of over-running the distance owing to the strong southerly current. If making the river in the evening and Shaweishan island or its light, or Amherst rocks, are not sighted when expected, the vessel should be hove to until daylight, sufficiently to the northward to allow for drift and a southerly current of 1 mile an hour, and the lead should be kept going.

Caution.—When approaching the Yangtze proper attention must be given to the set of the tidal streams and to the lead; navigation is fraught with danger where vigilance is wanting. Vessels should not anchor in the fairway.

Tungsha bank is hard, but South banks are soft.

Fairway bell light buoy to Wusung river.—Owing to the constant change in the channels and banks in the entrance of the Yangtze, the positions of the light-vessels and buoys are altered as necessary; the tidal streams also are strong; and it is advisable that mariners in vessels over 12 feet draft of water should employ a pilot, unless they have recent local knowledge.

The following directions should be considered temporary only:

Pass about ½ mile southward of the fairway buoy and steer 289° until the Tungsha light-vessel bears 312°.

Approach the light-vessel on this bearing and leave her about ¼ mile to the northeastward, then pass about 400 yards northward of the *Fairy* wreck buoy and southward of the Kiutoan light-vessel.

From the Kiutoan light-vessel continue 321° up the river for the Southeast knoll light buoy. The tidal streams must be allowed for in the above courses.

In a vessel of heavy draft arrive at the fairway buoy in entering about an hour before high water, or at the Fairy flats, if going out, about half an hour before high water, and a speed of 12 knots is necessary in order to clear the shoal water before the tide falls much. The fall of the tide is small for about 1½ hours after high water.

Pass southwestward of the Southeast knoll light buoy, and alter course as necessary, using the chart as a guide to the entrance of Wusung river.

Generally the edge of the northern bank is lined with heavy fishing stakes, planted in 4 and 5 fathoms, with only a few feet water close inside them.

From the southward—Steam vessels.—Full-powered steam vessels making the Yangtze steer for Steep island pass and take it in about midchannel on about a 347° course.

In thick weather, with the land obscured, it is advisable to anchor before having run the distance to Steep island, notwithstanding the fog signal there. Good anchorage can be obtained in about 20 fathoms, mud. The streams are very strong, and in anchoring bring the ship head on.

From Steep island pass steer to pass 1 mile eastward of Elgar island, whence proceed through Bonham strait, and thence, having passed Bonham rock and Button islet, direct to the fairway light buoy, in the vicinity of which there is nearly always a pilot. Gutzlaff island is passed on the port hand at a distance of 5¾ miles. In steering for the buoy Gutzlaff light-house must not be brought to bear eastward of 177°. In making the Yangtze at night either Gutzlaff or Shaweishan light is sighted. When approaching Steep island and from thence to the river it is necessary to allow for the set of the tidal streams when shaping a course.

If the weather is bad and there is no pilot at the fairway buoy, it is well to proceed in, passing about ½ mile southward of the fairway buoy, steering about 304°, with the Tungsha light-vessel on the starboard bow. Pass about 400 yards southward of the light-vessel and anchor in 19 to 21 feet, with the light-vessel bearing about 135°, distant 2 miles.

Vessels drawing about 15 feet and upward must consider the state of the tide in order to have sufficient depth of water when approaching the fairway buoy and entering the river.

In misty or foggy weather when Gutzlaff island can not be seen from a reasonable distance, it is best to anchor, taking care to be out of the fairway; it is then not safe to attempt to make the Yangtze, as tidal streams are rotary and strong, and neither their rate nor direction can be relied upon exactly, both being altered by freshets, passing typhoons, or strong winds prevailing in one direction for a long time. Vessels drawing 21 feet and under can bring up southwestward of Gutzlaff; those of greater draft northward of Elliot island; in both cases clear of the telegraph cables.

Steam vessels of small power or vessels in tow may during summer use the same track as steam vessels of full power. During winter, when northerly winds prevail, they can make use of the passages southward of Chusan. If drawing 20 feet water or less, they can pass inside the Kueshan islands and through one of the passes of the Fatu channel; if drawing over 20 feet, they should pass outside the Kueshan islands and through the Vernon channel, which is easily made by a bearing of the conspicuous summit of Tauhwa. The track then for both light and deep draft vessels leads past Roundabout island, through Tower hill and Blackwall channels and Blackwall pass, westward of West Volcano island, southeastward and eastward of the Rugged islands, eastward of Gutzlaff, then to a position 37°, 8 miles from that island and direct to the fairway light buoy.

NOTE.—If in thick weather a vessel passes eastward of the Chusan islands, it is necessary to pass outside Barren islets, giving them a very wide berth, and it is then difficult to pick up the land again.

Sailing vessels.—Sailing vessels approaching the Yangtze from June to September, when southerly winds prevail, make Video island, passing about 1 mile outside it; the track is then between the Saddle and Parker islands and direct to the fairway light buoy. In passing between the Saddle and Parker islands keep Bit rock close aboard and pass 1½ to 2 miles southwestward of the western Middle stirrup to clear Cairnsmore rock.

In steering for the fairway buoy do not bring Gutzlaff light-house eastward of 177° until a pilot is on board.

In winter, when northerly winds prevail, after passing Video work up between Tsusan and the chain of islands southward of it, then to the eastward of Rugged islands and Gutzlaff. The water in this route is smooth for beating, and anchorage in moderate depth can be obtained at any time should wind and tidal stream both be unfavorable.

The passages northward and southward of Chusan are not recommended for sailing vessels on account of baffling and uncertain winds, the great rate of the tidal streams, and the uncertainty of obtaining anchorage in a reasonable depth should the wind fail.

Wusung river.—A conservancy board was established in 1902 for the improvement and control of the Wusung (Hwang pu), below Kiang nan arsenal. The board regulates the placing of moorings and the berthing of vessels; it has control of all floating lights, buoys, beacons, landmarks, and light signals, as may be necessary for the safe navigation of the river, with the exception of light-houses. The board appoints the harbor master and his staff; it has power to organize a police and watch service; and it has the direction and control of the Shanghai (Lower Yangtze) pilot service. Licenses for pilots for ships bound to Shanghai are only issued by the board.

Caution.—Mariners are warned that in consequence of considerable changes taking place, B. A. chart No. 1601, Wusung river, can not be implicitly relied on; and that it is necessary either to take a pilot or obtain information as to the condition of the bar from the customs signal station before attempting to cross it.

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Pilots.—There are no pilots in attendance at Wusung, but a signal for a pilot is taken in at Wusung light-house and telegraphed to the pilot office at Shanghai.

Outer bar.—The outer bar of Wusung river commences about 1 mile from thé entrance to the river, and carries a least depth of 12 feet at low-water springs, over a narrow channel between shallow and extensive flats which border both shores of the river entrance. Vessels anchoring outside the outer bar should avoid doing so near the bar leading marks.

Tidal signals indicating the depth of water on Wusung outer bar on the line of the leading marks are exhibited on a mast near Wusung light-house. The signals are the same as those used for the Inner bar.

South bank.—The bank off the right bank of the entrance of the river is of soft mud.

Outer bar light-boat.—A junk painted black with one mast surmounted by a black ball, is moored on the southern side of the outer entrance to the channel over the outer bar, with Wusung light-house bearing 257°, distant 2,300 yards, and exhibits two fixed lights placed vertically, the upper red, the lower white, visible 1 mile. Vessels should not pass southward of the light-boat.

Wusung spit, of hard sand, extends off the shore of the rivers between Paoshan and Wusung light-house.

Wusung spit light buoy, conical, red and black vertically striped, with a black spherical cage, is moored on the northeastern edge of Wusung spit, and shows an intermittent red light every 8 seconds, thus: Light, 4 seconds; eclipse, 4 seconds.

Fort light buoy, black, with a conical superstructure, is moored on the southern side of the inner entrance to the channel over the outer bar, and shows an intermittent white light every 8 seconds, thus: Light, 4 seconds; eclipse, 4 seconds.

River entrance.—The left bank of the river entrance is low, protected by embankments from freshets, highly cultivated, and intersected by numerous canals.

Wusung village lies on the northern side of Wusung creek, which enters the river at 1 mile above the light-house. At the village there are some godowns and whitewashed buildings; it is also the terminus of the railway to Shanghai, a distance of 11 miles, but the railway is being continued northward.

Light.—Wusung light-house, a square black tower, 58 feet high, on the left bank of Wusung river, near Wusung, exhibits at 50 feet above high water, a fixed light, which shows white from the river bank northwestward of the light-house to 199°; green between 199° and 242°, and red between 242° and the left (western) bank of Wusung river.

The white light should be seen from a distance of 12 miles, the red 8 miles, and the green 5 miles.

The limits of the colored sectors shown from Wusung light-house are subject to alteration consequent on changes in the channel.

Light beacon.—The white pole with circular topmark from which a fixed red light is exhibited is now situated in the position of the inshore end of Prince's wharf on the same line of bearing as before, the wharf having been destroyed. This, in line with Wusung light-house, 253°, leads between the Outer bar light-boat and Wusung spit, and in the deepest water over the outer bar.

Anchorage.—Vessels laden wholly or in part with explosives shall remain anchored outside Wusung outer bar at a safe distance from other shipping and out of the way of ordinary traffic, and shall fly a red flag at the fore.

Customs signal station.—At about 1 mile above Wusung creek is the customs signal station, a conspicuous square white building, in front of which is a signal mast from which is signaled the depth on the inner bar; storm signals are also exhibited here.

The right bank of the river entrance is very low, and mud flats extend off it; it is reedy as far as Pheasant point, a sharp elbow, about 1 mile within the entrance.

Anchorage.—There is good anchorage in the river southward of the light-house, but as the harbor is often full of shipping, it is advisable to communicate by signal with the berthing officer and ascertain that there is a vacant berth suitable for the ship before entering.

As a rule vessels of war anchor outside the outer bar, but in exceptional cases they are permitted to anchor in Wusung anchorage. The northern limit of Wusung anchorage is a line drawn 132° from Wusung light-house, and the southern is a line drawn 27° from the limit beacon, on the left bank, at 2,500 yards above the customs station.

No vessel is permitted to anchor in the line of the leading marks indicating the channel across the bar, or within 500 yards below or 100 yards above that line.

The signal for the berthing officer is International Code flag N at the fore; if this flag is hoisted he will come on board at the anchorage.

It is a frequent occurrence for vessels at anchor off Wusung to drag—in some cases men-of-war have dragged for over a mile; large sailing vessels often drag at springs with any wind—and it is recommended that vessels should moor, so that the anchors would not be turned over at each change of the stream, and therefore have a better chance of holding. A spare anchor should be ready to let go, as the water comes in rushes at springs. A large vessel about to anchor off Wusung should cross the outer bar at the turn of the tidal stream, so as to enter against it; at springs it is dangerous to moor with a following tidal stream.

The river.—At 1½ miles southeastward of Pheasant point is the northwestern end of Gough island, which extends 1$\frac{4}{10}$ miles southeastward with an average width of about 700 yards; this island is always above water. A dry spit extends 1,400 yards northwestward of it, and two banks which dry lie within 1,600 yards southward of it.

The narrow ship channel leading to Shanghai lies between Gough island, with the spit and banks, and the right bank of the river. Junk channel, southwestward of Gough island and the spit, is half a mile shorter than the ship channel, but the passages between Gough island and the bank, southward of it, and between the banks are narrow, with depths of 6 to 7 feet at low water, while that between the southern bank and the left bank of the river is shallow. Above Gough island the banks of the river are of the same low character as at the entrance.

Inner bar.—The inner bar lies between Pheasant point and the spit extending west-northwestward from Gough island. It silts up during certain periods of the year, and is cleared away during others, with considerable regularity. The depth over it varies at low-water springs from 8 to 9 feet in the autumn (September, October, and November) to 12 to 13 feet in the spring (March, April, and May). When much rain falls during spring and summer in the area drained by the Hwang pu, the rate of the ebb stream is much increased, and there is a smaller deposit of silt on the bar, while the opposite is the case during a dry season.

The depth of water on the bar does not therefore depend altogether on the rise of tide, and it is impossible to give any rule as to what depth there may be over it at any particular time.

Inner bar marks and lights.—On the left bank of Wusung river at about 1,200 yards seaward of the customs signal station are two beacons—a low pole with a pyramidal top near the river bank and a high pole with a rectangular top farther inland.

A fixed white light is exhibited from the low pole and a fixed red light from the high pole, which are visible at a distance of 2 miles.

These beacons, or their lights, in line lead across the inner bar in the depth of water which is signaled from the customs station.

Inner bar light buoy.—A light buoy is moored about 400 yards southward of Pheasant point and northward of the line of the inner bar marks, and exhibits a fixed red light. The buoy is a guide to vessels rounding Pheasant point.

Light beacon.—On the right bank of Wusung river above the inner bar is a high pole with a rectangular top, the old high bar mark and one of the former leading marks over the bar. It exhibits a fixed red light visible 4 miles.

Tidal signals are shown from a mast at the customs signal station and indicate the depth of water on the inner bar of Wusung river.

These signals show the same when approaching the signal station, both from seaward and from Shanghai—that is, the north yardarm always appears to the right of the staff, and the south yardarm to the left.

A ball at the masthead indicates that the tide is rising. One at the gaff end adds half a foot to the depth corresponding to the signal.

When there are greater or less depths of water on the bar than provided for in the code, the number of feet is signaled by the International Code of signals at the masthead, and the half feet by a ball at gaff end.

At night white lights are used in place of the balls.

Depth of water in feet on Wusung inner bar.	South yard-arm.	North yard-arm.
8	● ● ●	●
9	● ● ●	
10	....	●
11	●	●
12	● ●	●
13	● ●	●
14	....	● ●
15	●	● ●
16	● ●	● ●
17	● ●	● ●
18	....	● ●
19	●	● ●
20	● ●	● ●
21	● ●	● ●
22	●	
23	● ●	
24	● ●	
25	....	● ● ●

Tides and tidal streams.—The average time of high water, full and change, on Wusung inner bar is 0h. 40 m.; springs rise 12 feet and neaps 7 feet 8 inches. It is high water, full and change, at Shanghai at 1 h. 30 m.; springs rise 10 feet, neaps 7 feet.

Under ordinary circumstances the average daily difference in the time of high water at Wusung is for the first 7 days after new moon, 40m., increasing to 50m. on the eighth day and 1h. 40m. on the tenth, then decreasing to 50m. on the twelfth and 40m. from the twelfth to the twenty-second, again increasing to 1h. 40m. on the twenty-fourth, then diminishing to about 20m. on the day before new moon.

The greatest irregularity in the daily difference occurs on the first, second, and third days after the moon's quartering, and it has been, under exceptional circumstances of weather, nearly 4 hours.

During springs the tide falls for about 8¼ hours and rises about 4 hours; during neaps it falls for about 7½ hours and rises for 4¾ hours.

The tides are much influenced by the wind, the flood making sooner, rising higher, and running longer than usual with the wind fresh between northeast and east, whilst with the wind strong from north to west the opposite is the case in each of these respects, the ebb running longer. The highest spring tides of the year usually occur in August. From about the middle of March to September the morning tides rise higher than the afternoon tides; during the other months the reverse occurs.

No rule can be given as to the day of the moon on which the highest or lowest tide takes place. The highest tide is often on the third day after full and change, but frequently on the second day after, more rarely on the first, and occasionally on the day of full or change. A similar irregularity is apparent as regards the extreme neap tides, i. e., those which give the least depth at high water, with reference to the time of the moon's quartering.

At Wusung at springs the ebb stream begins 1½ to 2 hours after high water, and at neaps 1¾ to 2½ hours after high water. The flood commences at springs 20 to 40 minutes after low water, and at neaps 1 to 1½ hours after low water. The streams make on both banks before they begin in mid-channel.

Off Wusung customs signal station the flood stream runs 4 to 5 knots and is at its strength when it is high water on the shore; the ebb is strongest on the opposite side of the river. At springs there is no slack, but at neaps sometimes an hour.

At Shanghai the tidal streams turn about 1½ to 2 hours after high water. Occasionally after rains the ebb runs for 8 hours and attains a rate of 4½ knots.

From observations the ebb stream was found to commence at from 2¾ to 3 hours after high water and to run until about 2¾ hours before high water.

Time signal.—In ordinary weather the time signal at Shanghai is visible from the mastheads of ships at Wusung anchorage.

Shanghai harbor is that part of Wusung river off the city of Shanghai extending from about 2¾ miles below Suchau creek to about 2½ miles above that creek. It is under the regulation of the harbor master, an officer appointed by the Wusung river conservancy board. The width of the harbor is about 500 to 700 yards, and it affords anchorage in 3½ to 8 fathoms. There are numerous wharves on both its sides, where any vessels that are able to cross Wusung inner bar can lie alongside. To assist in finding any vessel in the harbor, it is divided into nine sections, in which vessels lie in tiers (except in the dangerous area off the British consulate, where there is chowchow water).

Directions.—It is not prudent to enter Wusung river without a pilot, except with recent local knowledge, for the shoals in it are constantly changing.

Vessels approaching the bar having the tidal stream against them must wait for those going with the stream to pass; and a vessel overtaking another must regulate her speed so as to allow the vessel ahead to clear the bar first.

The entrance of the channel over the outer bar is indicated by the outer bar light-boat and Wusung spit buoy, and at present Wusung light-house in line with the beacon on Prince's wharf, leads over the outer bar in a least depth of 12 feet at low water. Fort light buoy is left 100 yards on the port hand, thence Prince's wharf is passed at the distance of 200 yards, and the left bank of the river kept at about the same distance.

There is a depth of 2 to 3 feet less water than that signalled between Wusung spit buoy and a point 700 feet northward of the outer bar light-boat.

The narrow part of the channel extends from 400 yards outside to 400 yards inside the outer bar light-boat, so vessels entering can open the leading marks to the northward when 400 yards inside the light-boat.

A clear channel is kept from the outer bar light-boat to the inner bar for the passage of vessels.

The fairway in Wusung anchorage is eastward of the berths in which steam vessels are moored in the lower anchorage, and it is unadvisable to enter while they are swung across the channel. The space between them and the left bank is generally impassable on account of the numerous junks anchored there.

As vessels of much draft are obliged to cross the inner bar at high water, while the flood stream is running strongly, when bringing the beacons for the inner bar in line, alter course in good time; for this the inner bar light buoy is a good guide. The flood stream sweeps up the river, attaining a rate of 4 knots an hour at springs and 2 knots at neaps.

Every vessel bound to Shanghai must, if her draft is too great to permit her crossing the inner bar on her arrival, anchor outside the outer bar till the tide suits.

No sailing vessel of any size should attempt to cross the bar in light winds if the stream is running strongly.

To cross the inner bar in the deepest water when proceeding to Shanghai, keep the low or eastern beacon in line with the high or western one which leads over the bar in the depth of water signaled from the Customs signal station. When over the bar close the right bank, altering course as requisite so as to preserve a distance of about 100 to 300 yards along the shore, using the chart as a guide.

When about 1½ miles from Putung point, either anchor to wait for the ebb stream, or cross to the left bank on a course about 277°, and keep along that bank; after passing Putung point, where great attention to the helm is necessary, the course is in mid-channel. It is dangerous to sail or steam through the shipping in the harbor, with the tidal stream.

Vessels entering the anchorage are boarded by the assistant harbor master, who directs them to proper berths. Pilots are not allowed to take a vessel up beyond the lower anchorage until her berth is known.

In the lower part of Shanghai reach fishing boats constantly anchor in a line across the river, but a passage through them is always kept clear. A vessel will generally pass southward of the shipping which lie in the upper part of this reach.

Tugs are available for hire, by the employment of which the risks of collision are in a great measure averted.

A convenient plan for anchoring, to await the making of the ebb stream off Shanghai, is just below Black point where the deep part of the river is more than 400 yards in width; anchor nearer the right bank of the river which is steep-to.

All vessels under steam shall, when to the westward of the International dock and under way, go at such speed only as is necessary to keep them well under command.

Commanders of vessels disregarding this rule will be held responsible for any damage that wash of their vessels may cause to pontoons and vessels lying thereat and to properly laden craft within the limit described.

Vacant buoys are marked at night by a sampan carrying a light.

When near the old dock and the entrance to Suchau creek, it is necessary to keep a sharp lookout, as long lines of Chinese house boats in tow of a single steam launch may suddenly come out of one of these creeks just ahead of the vessel.

Anchorage.—The anchorage for foreign vessels is between Yang king creek and the southern end of the Chinese bund.

The space in front of the British consulate, at the entrance of Suchau creek, is generally clear of vessels but the chow chow water caused by the sharp bend of the river at Putung point, renders it an insecure anchorage; the holding ground is indifferent, the anchors are liable to come home, the water is 8 to 16 fathoms deep, and a vessel constantly swings round and round, so that while mooring, before the swivel can be put on, several round turns may be taken in the cables.

The best berths are abreast and above the Imperial Maritime Customs house, along the left bank of the river. The tidal streams here are regular and have a less rate than in other places in the harbor, and a fairway along the right bank is kept clear. Vessels moor with at least 36 fathoms on each anchor, and a mooring swivel should invariably be used. It is necessary to moor taut, as the anchors generally come home after some time, and great care must be taken in laying the anchors, especially in long vessels, in order to insure a clear berth.

Outward-bound vessels waiting for sufficient water over the bar, anchor below Black point, which is nearly midway between Shanghai and Pheasant point.

Naval moorings.—A set of moorings is laid for the use of British naval vessels, with swinging room for second-class cruisers in a depth of 23 feet at low water; the buoy is off the imperial maritime customs-house. Ships having a ram take these moorings in on the port side or otherwise they foul it.

Clearing hawse.—Clear hawse in Wusung river on the last of the flood, when there are nearly 2 hours comparatively slack water, while at low water the flood stream sets in suddenly and there is scarcely any slack.

Shanghai is situated on the left bank of the Wusung river, 12 miles above Wusung; and within about 4 miles below the city there are ranges of great godowns, wharves, building yards, docks, works of all kinds, filatures, cotton mills, etc.

Shanghai is the most important center of foreign commerce in China; it was always a considerable place of trade from its being the nearest seaport to the great city of Suchau on the Grand canal 45 miles to the westward, but it rose within about a quarter of a century from 1842, when it was opened to foreign commerce, from being a third-class city to one of the chief commercial emporia in the world. The name signifies " Upon the sea," and although it is now 10 miles from the coast, Chinese annals state that it was once upon the seashore, and the low land which now intervenes has been gradually formed by alluvial deposits. For 50 miles around the city there is water communication with the interior in every direction by the numerous canals and creeks which intersect the province.

The foreign settlement is entirely distinct from the native city in boundaries, government, and commerce; in the last decade it has been extended to twice its former area, new roads have been made in all directions, and the old bungalows and one-storied godowns have given way to modern red brick four-storied buildings, while villas and terraces have been built on vacant ground. The native city is 1 mile long, ½ mile broad, and surrounded by walls; it has narrow, filthy streets. The French settlement is northward of and contiguous to it, lying between it and the Yangking pang canal; it also embraces the northern suburb, fronting the river northeastward of the native city, and extending as far as the creek which leads to the East gate. In the French settlement the noteworthy buildings are the consulate, the town hall, and the large but plain Roman cathedral. The fine wharves at which the Yangtze river steamers load and discharge are in this settlement; there are also the handsome premises of the Messageries Maritimes, above which in the river are the crowded tiers of the Chinese shipping.

The British settlement includes all the other European communities and consulates, and lies between Yangking pang canal and Suchau creek. The British consulate, a large square building with a long façade, stands near the long bridge which crosses Suchau creek. The position of the flagstaff is in Lat. 31° 14′ 41″ N., Long. 121° 28′ 55″ E.

All along the British bund are banks, hongs, hotels, and private houses of the most approved and massive Anglo-oriental architecture, standing in large shady gardens; the Hongkong and Shanghai bank, the Peninsular and Oriental Steam Navigation Company's office, the Canadian Pacific Railway office, the office of Jardine, Matheson & Co., etc., besides the residences of the foreign consuls, and in the middle of the bund is the imperial maritime customs-house, presided over by foreign inspectors. In this building are the offices of the coast inspector, harbor master, and of the engineer who has the superintendence of all matters connected with lights, buoys, and beacons. The English cathedral, a really beautiful edifice, built from the designs of Sir Gilbert Scott, is the finest ecclesiastical building in the Far East.

The American settlement, locally known as Hongkiu, extends 1 mile up the northern bank of Suchau creek and along the river side eastward; in it are situated the Sailors' home and the offices of many of the leading firms of Shanghai, besides hongs, warehouses, and hotels. The Putung side of the river opposite the American settlement is common to all foreigners. Above Putung point is the depot of the Chinese imperial maritime customs and a lookout and signal station, and is surmounted by a tall clock tower. The British cemetery is eastward of Putung point.

The population of Shanghai is about 651,000 (1908), of which 11,500 are foreigners in the settlements.

Time signals.—The signal by time ball is made daily from a brick tower erected on the bund of the French concession, 145 feet above the ground, and is visible from all parts of Shanghai harbor.

The ball is hoisted half-mast at 11h. 45m. a. m.; to the masthead at 11h. 50m.; and drops at 11h. 55m. 0.0s. mean time of the meridian of 120° E. Long., or 15h. 55m. 0.0s. Greenwich mean time.

The ball is immediately hoisted to the masthead, and drops a second time at noon mean time of the meridian of 120° E. Long., or 16h. 00m. 00s. Greenwich mean time.

In case of failure of the signal a yellow and blue swallow-tailed flag is hoisted, and is only kept flying for one minute.

A gun is fired at noon on Mondays and Fridays from the customs signal station at Putung point. It is fired by hand and should not be used for rating chronometers.

The mean time of the meridian of 120° E. Long. appears to have been adopted for standard time at Shanghai.

A chronometer comparison can always be obtained at the observatory hut attached to the storm-signal station by electric signal from Zikawei observatory.

Daily weather signals.—The undermentioned weather signals are now made from the storm-signal station by means of the flags of the International Code, instead of by those of the Marryatt Code formerly in use:

I. The 9.30 a. m. signal, indicating the direction and force of the wind at Gutzlaff at 9 a. m., is made as follows:

The direction by the flags N., S., E., W., and V. (variable) of the International Code, and the force by the numeral signals 0 to 11.

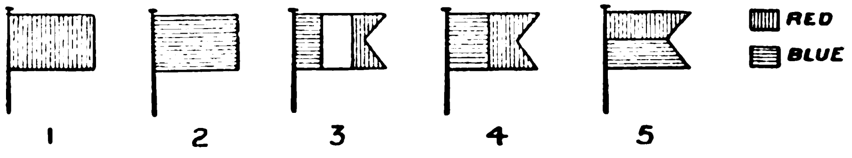
Letter U flag signifies calm, and a blue pennant that fog prevails.

This signal is lowered at 10 a m. In case of any delay it will be hoisted from 11.30 to 11.50 a. m.

At 3.30 p. m. a similar signal shows the direction and force of the wind at Gutzlaff at 3 p. m. In case of delay it will be hoisted from 4.15 to 4.30 p. m.

II. The signals indicating the probable direction and force of the wind on the coast and at Shanghai within the next 24 hours are made as follows:

Special Flags.



Flag No. 1 hoisted over any of the flags N., S., W., E., U., or V. of the International Code indicates the probable wind along the coast south of the thirtieth parallel.

Flag No. 2 hoisted over any of the flags N., S., W., E., U., or V. indicates the probable wind along the coast north of the thirtieth parallel.

Flag No. 3 indicates that fair weather is probable at Shanghai.

Flag No. 4 indicates that unsettled and threatening weather is probable at Shanghai.

Flag No. 5 indicates that rainy weather is probable at Shanghai.

III. The 4 p. m. signal, indicating height of the standard barometer at Zikawei Observatory, is made in the same manner as formerly, except that numeral signals of the International Code are used in the place of those of Marryatt's Code.

These weather signals are also made from the storm-signal stations at Wusung and Gutzlaff.

Barometer signals.—Signals, indicating the height of the barometer at Zikawei observatory at 4h. 0m. p. m., reduced to 32° F. and to sea level, are made daily at the storm-signal station from 4h. to 4h. 15m. The numeral flags used are the same as those used for the weather signals, but only three flags are used, the initial figure being omitted, thus: 024=30.24; 879=28.79. This affords a means of comparing barometers with a standard.

Communication—Railway.—A railway runs from Shanghai to Wusung at the mouth of the river; also to Nangking.

Telegraph.—There are two lines of submarine telegraph in communication with Europe, and land lines to the principal places in China connected with the universal telegraph system.

Steam vessels.—Shanghai is connected with a system of steamship lines which carry passengers and cargo to and from all parts of the world. The Peninsula and Oriental Steamship Navigation Company, the Messageries Maritimes, and the North German Lloyd maintain direct fortnightly mail services between the Far East and Europe, and the British and German companies in addition run a line of intermediate or cargo steamers at regular intervals. The Ocean Steamship Navigation Company, commonly called "Blue Funnel line," have a fortnightly service between Liverpool and China and Japan via ports of call. The Nippon Yusen Kaisha (Japan Steamship Company) has a regular service to Bombay and Europe; another across the Pacific to Seattle via Victoria, British Columbia; and short lines to Yokohama, Tientsin, Newchwang, and Formosa. The Glen line runs at triweekly intervals from London to Shanghai, and thence, as freight offers, to New York via Suez. Steamers of the Russian Volunteer fleet ply between Odessa and Vladivostok, calling at Shanghai; the Danish East Asiatic Company has started a line to Copenhagen and Baltic ports, and a varied fleet of tramps, chiefly British, German, and Norwegian, bring merchandise to the Shanghai market.

On the Pacific side the Canadian Pacific Railway Company's steamers have a triweekly service to Vancouver; the Pacific Mail Company, Occidental and Oriental Steam Navigation Company, and the Toyo Kisen Kaisha (a Japanese company) run in conjunction to San Francisco every 8 days. The Northern Pacific Railway Company's steamers run to Tacoma, Wash.; and the China Mutual Steam Navigation Company has a regular cargo service to Seattle.

The coasting trade radiating from Shanghai is almost entirely in the hands of three companies—the British Indo-China Steam Navigation Company, the China Navigation Company (whose fleet consists of over 70 seagoing and river steamers), and the China Merchants Steam Navigation Company. In addition to these are the steamers of the Hamburg-American branch line to Kiau chou and Tientsin in the north, and Hongkong and Canton in the south. Eight lines of river steamers run up the Yangtze to Hankow, namely, 4 British, 2 German, 1 Japanese, and 1 Chinese.

The Hamburg-American Company are about to establish a service between port Arthur, Dalny, Chemulpo, and Shanghai.

Docks.—There are the following dry docks at Shanghai: Cosmopolitan, length 532 feet, breadth 77½ feet, depth on sill and on blocks 24 feet; International, length 526 feet, breadth 77½ feet, depth on sill 23½ feet, and on blocks 22 feet; New, length 450 feet, breadth 74 feet, depth on sill 21½ feet, and on blocks 19½ feet; Old, length 400 feet, breadth 53 feet, depth on sill 16 feet, and on blocks 15½ feet; Tunkadu, length 350 feet, breadth 67 feet, depth on sill 16 feet, and on blocks 15½ feet; Kiangnan (government), length 376 feet, breadth 79 feet, depth on sill 19 feet, over blocks 18½ feet. The lengths above given are those on the blocks, the breadths at the entrance at high-water level, and the depths those at high-water ordinary springs.

Repairs of all kinds to ships, machinery, and boilers can be effected. A twin-screw steam vessel of 2,520 tons gross has been built at Shanghai. There are sheers to lift 75 tons.

The sheers at Tunkadu dock and the New dock will lift a weight of 60 tons; there are also other sheers which will lift 25 to 40 tons.

Naval yard.—The Chinese Government has a dock yard and arsenal at Kiangnan, which is about 3¼ miles above the storm-signal station.

Trade.—The principal articles of export from Shanghai are beans, cotton, hides, paper, rice, various seeds, silk, skins, teas, wheat, wool, and sundries. The value of the exports in 1906 was 118,990,510 haikwan taels, the tael being considered equal to 79 cents.

The principal articles of import are opium, cotton goods, woolens, metals, and sundries, consisting of cigarettes, coal, raw cotton, aniline dyes, flour, window glass, indigo, leather, machinery, matches, kerosene, and sugar. The value of the imports in 1906 was 225,043,251 haikwan taels.

Shanghai being essentially a distributing center, the majority of foreign imports are reexported, principally to Hongkong, Manchuria, Korea, Japan, and Chinese ports.

In 1905, 5,146 vessels, with an aggregate tonnage of 7,195,006 tons, entered the port. In addition, there is a large inland steam navigation trade.

The small number of foreign sailing vessels which visit the port are mostly 4-masted iron ships of recent construction, and chiefly engaged in bringing oil from New York.

Supplies.—Water for cooking and drinking purposes should either be distilled or obtained from the Shanghai Waterworks Company, as the river water is very impure and sometimes brackish, containing a large quantity of organic matter, and if used for drinking is a fertile source of sickness to the crews of vessels.

Provisions are plentiful and moderately cheap, and the markets are well supplied with beef, mutton, game, fish, and poultry. Vegetables are unsafe articles of diet, in consequence of the practice of sprinkling them during cultivation with liquid manure, and fruit is of poor quality; rice affords the best substitute for vegetable diet.

Coal.—About 60,000 tons of coal and 4,000 tons of liquid fuel are usually in stock. It is put on board at the wharves or from lighters by baskets. Labor is plentiful. Coals for vessels of war are sent alongside and put on board by coolies under a local contract.

Climate and prevailing diseases.—The leading features of the climate of Shanghai are, firstly, the extreme range of temperature from one of tropical heat in summer to one many degrees below freezing point in winter, or 102° to 18° F.; secondly, very sudden changes from extreme heat to excessive cold during spring and autumn (a fall of 20° to 30° often taking place in a few hours); and, thirdly, an almost constant excess of moisture, due to the fact that Shanghai is situated on and surrounded by a large alluvial plain, which is only a few feet above the level of the soil water, and which is intersected by a multitude of creeks in all directions. The climate is fairly healthy, and compares favorably with that of the large towns of Europe. The death rate amongst foreigners ashore and afloat in 1890 was 23.79 per 1,000.

There is cholera in the native city every summer, and partial outbreaks have occurred at intervals in recent years in the foreign settlements, but the majority of the foreigners' cases were among the merchant ships in the harbor.

Malarial fevers exist; dysentery and diarrhea are prevalent and apt to become chronic during spring and autumn on account of the sudden changes of temperature, with an atmosphere usually laden with moisture.

Seamen visiting the port should wear flannel belts round the belly and avoid chills; they should avoid the use of unripe or overripe fruit, native-made aerated waters, and ice, except machine-made from good water.

Smallpox may be considered epidemic amongst the Chinese during autumn and winter, and visitors should be revaccinated, if that operation has not been recently performed. Sunstroke is frequent during the very hot weather, which generally begins in the second week of July and ends in the second week of September; during this period no man should be allowed to go out in the sun who is suffering from even mild fever or who has consumed much intoxicating liquor.

Enteric fever is common in autumn. Venereal diseases are very prevalent.

Generally a healthy, temperate European or American who adopts ordinary and proper precautions has nothing to fear from the climate of Shanghai.

Winds and weather.—Throughout autumn, winter, and spring northwesterly, northerly, and northeasterly winds prevail, and there is much rain from January to April. March is generally raw, wet, and disagreeable. The winter is, however, tolerably salubrious, and in dry seasons highly enjoyable. The weather in April and May is often genial, the hot sun of midday being compensated for by cool nights. The influence of the southwest monsoon is so far felt at Shanghai that the prevailing winds during summer are southerly. October and November are bracing, dry, and sunny. Snow usually falls in December and January, when ice, thick enough for skating upon, occasionally forms. Owing to the wide range of temperature, the thickest clothing and furs are requisite during the winter, whilst in summer the thinnest fabrics are all that can be endured.

In March, April, May, and June fogs are common. Typhoons rarely occur at Shanghai.

Typhoon.—On the 1st and 2d of September, 1905, a typhoon of unusual severity, accompanied by a tidal wave, swept over the estuary of the Yangtze, causing great loss of life and property. At Shanghai the river rose 16 feet above zero, viz, 4 feet 6 inches above the usual level of high-water spring tides, flooding the bund and streets of the settlement to a depth varying from 2 to 4 feet.

The Hwang pu river was ascended in 1862 for 35 miles above Shanghai by a vessel drawing 20 feet of water, which moored in 16 fathoms off the entrance of a creek leading to the city of Sun kiong. At the entrance to this creek it is high water, full and change, at about 3h. 30m.; rise 5 feet, but the tides are irregular. At Ming hong, 15 miles lower down the river, it is high water at 2h. 20m.; rise 6 to 7 feet.

Suchau, the capital of the province of Kiangsu and a city of about 500,000 inhabitants, is situated on the Grand canal at about 37 miles west-northwestward of Shanghai, with which it is connected by canal. It was opened to foreign trade in 1896, and the principal article of export is silk. The canals are generally navigable by steam launches, but from want of conservation they are sometimes dried up in places in certain seasons.

Wusung to Hankow—The Yangtze river for 80 miles above Wusung river has a breadth of 3 to 9 miles, which farther up contracts. The channel is subject to continual changes, caused partly by the annual floods and partly by the ebb and flood streams flowing in different channels, the effect of which is that vast flats, shoals, and middle grounds are formed, which frequently alter both in extent and position. The services of a pilot are in most cases indispensable. Langshan crossing was formerly considered the most difficult part of the river, but it, as well as some other intricate places, has been lighted and buoyed.

In many parts of the river material changes are constantly taking place.

In consequence of the great freshets that occur during the summer or rainy season, the Yangtze kiang rises to an extraordinary height, covering its banks and extending in some places several miles inland, entirely changing its aspect and assuming the character of a large lake. The navigation at such times becomes very difficult, while the downward stream, attaining the rate of 7 or 8 knots, sometimes sweeps away the buoys and beacons, the channels undergo great changes, and islands are converted into shoals, or the contrary. A good local knowledge enables vessels of small draft to avoid the strong ebb stream by passing over the submerged lands. Flat-bottom steamers drawing little water and of great speed are best adapted to the navigation of this river.

The several lights and light-vessels which have been placed at various parts of the river to facilitate navigation are maintained by the Chinese Government and are under control of the imperial maritime customs. The positions of the floating lights are altered as occasion may require.

A light-boat when out of her station flies a red flag.

In the following directions, relating to the navigation of the Yangtze below Kiukiang, the low-water level or zero of the river gauge at that port is used for indicating the drying of shoals and the flooding of the banks; between Kiukiang and Hankow the zero of the latter place is used.

Above the limit of tidal influence the letters H. L. and L. L. indicate summer or winter water level, respectively.

Tidal streams.—In the lower part of the river the tidal streams are rapid and can be worked with advantage. In winter a vessel steaming 11 knots can reach Chinkiang (156 miles) in 12 hours from Shanghai on one tide, taking the first of the flood at Wusung.

Above Tatung, 335 miles from the sea, where the tidal influence ceases, the rate of the current varies greatly; much of it can be evaded in summer by keeping in close and by taking cut-offs.

Communications.—There are telegraph offices at all the treaty ports in the Yangtze.

There is regular steam communication between Hankow and Shanghai and the intermediate ports 6 times a week. The passage either way is made in about 3 days.

The shore of the Yangtze kiang from Marecageuse point, at about three-quarters of a mile seaward of Wusung light-house, trends northwestward for $1\frac{4}{10}$ miles to Paoshan point, and then, forming a bight, continues in about the same direction to Clump point.

The uniformly level banks of this part of the river are covered with trees, and the height of the embankments prevents houses and other objects inland being seen.

Paoshan pagoda, situated within the walled city Paoshan, is a gable-topped structure, more resembling a joss house than a pagoda. It forms a good mark, and is visible from almost all parts of Chung pao sha or Bush Island channel and the entrance to Wusung river; westward of it, and close to, are two joss houses or temples which stand out from the other buildings; and inland, 900 yards south-southwestward from the pagoda, is a conspicuous round tree.

Strawstack tree, 1,900 yards westward of Paoshan pagoda, is remarkable from its general resemblance to the pagoda, and is conspicuous both from eastward and westward.

Sloping clump of trees, near the shore at $3\frac{3}{4}$ miles northwestward of Paoshan pagoda, is remarkable, the top having a very decided slope, unlike that of any other tree in this locality, and it is visible from a long distance, both eastward and westward.

Bridge beacon, nearly 2 miles northwestward of the Sloping clump, is a spar surmounted by a spherical cage.

Chung pao sha or Bush island channel divides Chung pao sha island from the mainland: it is about 5 miles long by nearly 1 mile in breadth, with depths in it of 5 to 9 fathoms. There are several good marks on the Paoshan side and the quarantine beacon on Chung pao sha by which to ascertain the position by cross bearings.

Paoshan shoal, fronting Paoshan point, has a depth of 9 feet near its outer edge at about $\frac{3}{4}$ of a mile northward of Paoshan point. From Paoshan shoal, Blonde shoal, which dries for some distance off the shore, continues northwestward for several miles; and abreast Liu creek, at 6 miles above Bridge beacon, the 3 fathoms contour line is $1\frac{1}{2}$ miles offshore.

Pien tan sha is an island lying rather over 1 mile southward of Tsungming; its southeastern end bears 333° $7\frac{1}{2}$ miles from the northwestern end of Chung pao sha, whence it extends 5 miles west-northwestward, with an average width of $1\frac{1}{10}$ miles. At about $1\frac{4}{10}$ miles from its western end and $\frac{1}{4}$ mile within its north coast is a beacon, consisting of a spar surmounted by a spherical cage.

Tsungming flats extend between Tsungming crossing and Pien tan sha island; they are dry in places and in others there is a depth of 3 fathoms; they also extend nearly 2 miles southwestward and westward of Pien tan sha, whence their western edge runs northward toward the Southwest beacon on Tsungming.

Beacons.—Southwest beacon, near the southwestern point of Tsungming island, is an openwork wooden structure surmounted by a spherical cage.

Leo point beacon, on the right bank of the river at about N. 25° W. 6¼ miles from Liu creek entrance, is similar to Southwest beacon.

Fork tree beacon, on the right bank at 9 miles northwestward of Leo point beacon, is a spar with two spherical cages.

Cone tree beacon, on the western coast of Tsungming island at $3\frac{4}{10}$ miles from Southwest beacon, is a spar surmounted by a spherical cage.

Mason point beacon, on Mason point, Tsungming island, is an openwork wood structure surmounted by a spherical cage.

Niu creek beacon, on the left bank of the Yangtze about half way between Mason point and Lang shan, is an openwork structure of wood surmounted by a spherical cage.

Actæon shoal extends off the right bank of the Yangtze between Leo point and Fork tree beacons to about $1\frac{4}{10}$ miles southwestward of Tsungming island. Centaur shoal lies off the same bank between Actæon shoal and Plover point.

Mason bank extends westward of Mason point, and westward of Mason bank flats and shoal water stretch for about 3 to 5 miles off the left bank of the river.

Harvey point channel lies between the Tsungming flats, Tsungming island and Mason bank on the east and north, and Actæon shoal on the west and south. It has a least width of about 1,000 yards and a least depth of about 7 fathoms.

Harvey point channel is now disused and the buoys marking it, viz, Cone Tree buoy, northeast Actæon buoy, Fairway buoy, and Mason bank buoy have been withdrawn.

A red spar buoy has been placed in the position formerly occupied by Mason bank buoy, for the guidance of native craft.

Southeast spit light buoy, at the southern entrance to the channel, is painted red; the period of the intermittent light shown from it is 8 seconds, thus: Light, 4 seconds; eclipse, 4 seconds.

Confucius and Centaur channels, to the westward of Actæon shoal, which are available for navigation, are buoyed in accordance with the Chinese uniform system.

Plover point, about 300° $7\frac{6}{10}$ miles from Fork tree beacon, has a village on it, also a small fort or breastwork, an open group of trees, and a wooden tripod beacon bearing a spherical cage. Many junks are generally at anchor in a creek opening at this point. Fu shan, on the river bank at 11 miles westward, is a hummock crowned by trees and a few white houses, with, on the slope, a small fort, like a martello tower.

Langshan flats front the left bank of the river for about 12 miles northward of Plover point, and are very shallow in most places. The southwestern edge of these flats is now nearly 7 miles distant from the left bank and about 2 miles from the right bank.

Langshan crossing commences above Plover point, and leads across the extensive middle grounds which occupy the bed of the river from Plover point to Pitman-King island. Langshan summit, a little inland on the north shore, is 375 feet high and double, on the western of which is a pagoda. The crossing limits are marked by Waterman bank and Johnson flats to the westward, and North bank to the eastward. The river at this point, flowing through an alluvial plain, opens out to a breadth of 9 miles; the channel and shoals are subject to constant change; it is buoyed according to the Chinese uniform system, and the buoys are often moved.

Caution.—In thick weather the crossing can not be taken with safety, and at all times this part of the river should be navigated with caution and the lead kept going.

Captains and pilots passing are requested to report any damage done to the buoys and any changes in the positions of banks or shoals.

North tree light beacon.—Vine point is situated on the left bank of the river about 13 miles from Plover point, and on the same bank of the river at about 347° $3\frac{7}{10}$ miles from Vine point, is a beacon, consisting of a pole surmounted by a ball, which exhibits at 65 feet above high water a fixed white light, visible 7 miles.

North tree rocks, $1\frac{2}{10}$ miles from high-water mark on the left bank of the river abreast the beacon, have only 2 feet water over them at low water springs during the lowest stage of the river.

Creek anchorage, $3\frac{1}{2}$ miles northwestward of North tree beacon abreast a village on the left bank is used by the pilots for anchoring at night.

Tides.—It is high water, full and change, at Langshan crossing at 2h. 40m.; springs rise 12 feet, neaps 8 feet; and neaps range 4 feet. At springs the tide rises for 3 hours and falls for 9 hours; at neaps it rises for 4 hours and falls for 8 hours.

In winter the flood does not last so long on account of the strong current down the river. The commencement of the flood at springs is accompanied by a slight bore. In April the morning tides are higher by 1 foot than the afternoon tides. Most of the banks are covered with 3 feet tidal rise.

There is no precise information as to the times at which the tidal streams turn. The flood stream attains a rate of $5\frac{1}{2}$ knots, and the ebb 6 to 7 knots at springs.

Caution.—During the summer inundations, the downward stream often becomes very rapid, sometimes sweeping away the buoys and beacons, and great changes frequently take place in the channels, shoals being converted into islands or the contrary. Navigation then is extremely difficult.

Pitman-King island, the eastern part of which is about 4 miles westward of North tree beacon, extends west-northwestward about 10 miles. It is cultivated and there are villages on it. Keashan point, the western end of the island, is wedge-shaped, the higher part being toward the river and 90 feet high.

Kiushan point is on the left bank of the river at about 12 miles above North Tree beacon; the navigable channel has recently cut through the point.

Cooper bank commences at about 5 miles eastward of Keashan point, and it extends from off Pitman-King island and the right bank of the river for a distance of about 9 miles northword to about ½ mile from the left bank of the river. It is covered with bushes and reeds. The vicinity of the whole of the eastern part of this bank appears to be in a condition of change.

Light-boat.—A light-boat, painted red and having one mast surmounted by a ball, is moored in 24 feet of water to mark the southeastern edge of Cooper bank. It exhibits, at 25 feet above water, a fixed white light, which is visible 7 miles. The best water is found by passing about 200 yards eastward of the light-boat.

Tung lo tu light beacon.—A black pole, surmounted by a wicker ball, on the left bank of the river at 261° 6½ miles from Keashan point, exhibits at 49 feet above high water a fixed white light which is visible 7 miles.

The hills in the vicinity are 250 to 350 feet in height.

Ching wong kong is a large village situated at the mouth of a creek on the north bank of the river about 7½ miles below Tong lo tu beacon. It is the river port of a city situated on this creek some miles inland.

Mud island, about 2 miles in length, east and west, is 2½ miles westward of Keashan point; a shoal extends westward and southwestward of it, the western edge of which forms nearly a continuation of the western edge of Cooper bank.

Kiangyin point is on the right bank of the river at 7 miles above Tung lo to beacon; eastward of the point is the high land of Hwang shan.

The river narrows to 1,200 yards northwestward of the point, but immediately afterwards becomes wider. One mile southwestward of the point is the entrance of a creek leading to the walled town Kiangyin, 1 mile inland, in which is a pagoda.

Directions—Wusung to Kiangyin.—The following directions indicate the general route now taken. They are not to be depended on for navigating the river, and, owing to the constant changes in the channels and the rapid tidal streams, a pilot should be employed. The most recent information regarding the channels and shoals should be obtained locally.

After passing Wusung spit buoy keep northward until in mid-channel and then steer northwestward between the shoals.

The tidal stream must be allowed for, and in descending the river toward Chung pao sha beware of the ebb stream setting strongly toward the shoals northward of that island.

From a position in mid-channel southwestward of Pien tan sha steer for the southeast spit buoy at the southern entrance of Harvey point channel. Leave this buoy on the starboard hand and steer for the Doves Nest buoy, leaving it on starboard hand, thence as requisite between the buoys marking Confucius and Centaur channels.

The track at present leads about 1 mile northward of Plover point, where care is necessary, as the shoal off that point is very steep-to, and passes Middle bank buoy close-to on either side. Then shape course from buoy to buoy, leaving the North bank, Langshan, and Vine point lower buoys on the starboard hand, and passing midway between Vine point and Waterman bank buoys. Proceed northward between the shoals, leave Upper crossing buoy close-to on either hand, and follow the channel to North tree beacon, passing between it and North tree buoy.

Keep the left bank of the river aboard for about 2 miles from North tree beacon, then alter course westward through the channel. Approach the light-boat in the channel off Kiushan point on a northwesterly bearing, leave her on the port hand and steer about 333°; but this channel is in a condition of change and requires recent local knowledge. Then keep the left bank aboard till abreast Tung lo tu beacon, when gradually increase the distance from the left bank to about ¾ mile at 4 miles above the beacon, whence pass 400 yards off Kiangyin point.

After passing Tung lo tu beacon the most dangerous part of the navigation of the Yangtze has been accomplished, for in no other portion of the river do we find the same rapid alterations in the bed as in the vicinity of Fushan and Langshan.

Kiang yin to Silver island.—From the mouth of the creek leading to Kiang yin the right bank of the river is bordered by a mud flat nearly 1 mile in breadth and very steep-to for a distance of 11 miles. From Kiang yin point keep 1,000 to 1,400 yards from the left bank, and between Bate and Collinson points keep mid-channel.

Kiang yin shoal, with 2 fathoms least water, is a narrow shoal about 2 miles in length, lying off the left (northern) bank of the river nearly midway between Kiang yin and Bate points.

There is a narrow channel between the shoal and the left bank of the river, but the track recommended passes to the southward of it.

A shoal, with a depth of 4 fathoms over it, is shown on the chart at a distance of 2¾ miles to the southeastward of Bate point beacon and just to the southward of mid-channel.

Light-boat.—A light-boat, painted red, and having one mast surmounted by a ball is moored on the southern edge of Kiang yin shoal. It exhibits, at an elevation of 25 feet above water, a fixed white light, which is visible 4 miles.

Bate point light beacon.—A black pole surmounted by a wicker ball, on Bate point, exhibits at 53 feet above high water, a fixed white light, visible 7 miles.

Hermes channel.—Above Collinson point are Starling, Fishbourne, and Manila islands, low, and occupying the western portion of the river, which at this part is very broad. Hermes channel, which alone is navigable, is between Fishbourne and Manila islands and the left bank of the river, and the fairway is in the middle of it.

Shoal water extends for nearly 1 mile to the eastward of Fishbourne island, and the track recommended follows the left bank of the river.

The track continues northward and passes close westward of Pottinger, or Beaver, island, the southern end of which is situated about 3 miles northward of Manila island.

Beaver light beacon.—A black pole surmounted by a wicker ball, near the northern end of Pottinger island, exhibits at 52 feet above high water, a fixed white light, visible 7 miles.

Kiying or Low island is just above Pottinger island; the track passes westward of it and then curving to the westward gradually closes the left bank of the river. Great caution is necessary in this vicinity, as the islands and shoals are very difficult to define, and are constantly shifting.

Parker point, on the right bank of the river, is 5½ miles above Kiying island, and westward of the point is Rose island, with outlying shoals extending nearly across the river. The narrowest part of the channel is 1 mile eastward of Sinnimu creek.

Sha yau ho, a creek leading to Starling island, has its entrance in the right bank at 3 miles above Parker point; it is now closed except for small junks; and immediately above the creek is hilly ground on which is the conspicuous Chusan pagoda.

Between Kiang yin and Chusan pagoda the banks are flat and monotonous, the only rising ground being Keun shan, on which are some houses, seen nearly ahead from the reach below Fishbourne island.

Espiègle rock, nearly awash at high water, is situated 2½ miles above the Sha yau ho, and 400 yards off a projecting point of the right bank. Pass the rock in mid-channel, for the left bank is bordered by a shoal, steep-to, and extending 1½ miles below the custom-house.

Keep about ¼ mile off the left bank for 2 miles above the custom-house, and thence from 1,000 to 600 yards off the right bank passing northward of Calliope shoal.

Tan tu light beacon.—A black pole surmounted by a wicker ball, on the right bank of the river at 5$\frac{4}{10}$ miles above Espiègle rock, exhibits at 75 feet above high water a fixed white light, visible 7 miles.

When 1½ miles above Tan tu beacon, keep the right bank aboard as far as Silver island; changes are taking place on the left side of the channel.

Seu tu channel, between Chang sang chau and Seu tu chau on the east and Ta sha on the west, the entrance of which is northeastward of the Tan tu beacon, is deep, but shoals to 5 fathoms at its northern end; and the passage northward of Ta sha leading northward of Feather and Silver islands, has a least depth of 21 feet in the fairway. A shoal extends northwestward of Kao kea sha, which lies westward of Ta sha, to about ½ mile from the left bank of the river.

Ta sha (Seu teu) channel, eastward of Ta sha, is the channel now generally used.

Light-boat.—A light-boat, with one mast surmounted by a ball, is moored at the upper end of the crossing off Chin chau point in a depth of 29 feet, at a distance of 2 miles, 80°, from the lower leading beacons for Silver island crossing. It exhibits, at an elevation of 25 feet above the water, a fixed red light.

Directions.—Vessels bound up river will find the deepest water by keeping close to the western shore of Seu teu chau (Chin chau) until the light-boat and the lower leading beacons for Silver island crossing are in line, bearing 260°; keep them in line until near the light-boat, which leave on the starboard hand, and continue steering for the beacon on the same bearing. When near the leading beacons, a sharp turn to the southward is made and Silver island is passed at a distance of about 300 yards. When abreast of Silver island crossing the current will be found treacherous, and the steering must be carefully attended to.

Silver island is situated at a bend of the river 5$\frac{6}{10}$ miles above Tan tu beacon. The eastern end is flat, but the western is a wooded hill or bluff, 233 feet high, surmounted by a fine but low pagoda. Feather islet, 63 feet high, is 400 yards northward of Silver island. Silver island spit extends ¼ mile eastward of the island.

Buoy.—The end of this spit is marked by a conical buoy, painted in black and red vertical stripes, and surmounted by a diamond. Vessels should not pass between this buoy and the island.

Silver island crossing, between Silver island spit and the shoals extending off Kaokea sha, is silting up.

Leading light beacons.—Leading beacons have been placed on the left bank of the river northward of Feather islet to guide vessels over Silver island crossing. The inner and higher beacon bears a black square; its light hut is painted black, and it exhibits a fixed red light. The front beacon bears a black and white diamond; its light hut is painted white, and it exhibits a fixed white light.

There is a depth of 24 feet at lowest water on the line of these beacons, but on either side near Silver island spit buoy there are patches of 23 feet at 100 feet from the line. 'Caution is necessary, as the depth is subject to rapid change, and these marks should not be used without recent local knowledge.

During low river, and until Silver island crossing deepens, the fixed red light on the high or inner leading beacon will not be exhibited.

Silver island pass.—Rocky reefs extend nearly 300 yards off the southern side of Silver island, and Furious rock, which has 6 feet water over it at low river, lies 200 yards from the island. Rocky reefs also extend off the right bank of the river for a distance of about 400 yards.

The distance between the island and the right bank of the river is 300 yards at its narrowest part, but the navigable pass between the reefs is about 130 yards wide with a least depth of 21 feet. This is a difficult part of the river.

A quick helm is required in passing through to meet the whirling eddies or chow chow water in the pass. The stream in the pass is rapid and is said to attain a rate of about 8 knots. The pass is less subject to change than other parts of the river, the bottom being rocky.

Shoal.—A shoal lies off the left bank of the river from above Silver island to Chang ho tau village, which is nearly abreast Chinkiang. At its widest part the shoal extends 800 yards from the river bank, and it is rapidly increasing.

Chinkiang, a treaty port, is on the right bank of the river, 2 miles above Silver island and 190 miles from the sea. Chinkiang fu is a walled city about 4 miles in circuit and ½ mile from the bank of the river, the space between having been an extensive surburb, which was surrounded by a wall during the rebel occupancy of the city, so that the fortifications now extend to the water's edge.

The foreign concession extends along the level part of the river side above the city from the custom-house at the mouth of the Grand canal as far as Yin shan (Garlic hill), a steep acclivity on the south-eastern part of which is the British consulate. It has a fine bund and prosperous looking houses; trees are numerous. The population of Chinkiang and its native surroundings is estimated at 200,000.

A mud bank extends several hundred yards off Yin shan, decreasing in width eastward, and a row of hulks connected by bridges with the river bank offers facilities for landing goods and passengers.

Landmarks.—The white buildings of the London Missionary Society, standing on an elevation behind the city, are conspicuous. The British consulate is a red brick building.

Communication.—There is a telegraph station here, which is open from 7 a. m. to 11 p. m.

Steamers call daily, both up and down, except that there is no up steamer on Mondays and no down steamer on Tuesdays.

Storm signals are shown from the customs signal station.

Chinkiang shoal, situated about 200 yards off shore abreast the custom-house, has disappeared and there is now a depth of 16 fathoms over its position.

Coal.—About 500 tons of coal are usually in stock.

Shoal.—Three small patches of stone, on which are depths of 10 feet, lie 30 to 60 feet off the German hulk *Bremen.*

Golden island is the extremity of a low grassy point; it is covered with temples and there is a slender pagoda on its summit.

In 1823 the island was on the left bank of the river, and in 1842 it was in the middle of the river.

The shoal off Golden island is at present extending about 120 feet annually.

River level and tides.—The river level at Chinkiang is lowest in January and highest in July and August. The rise commences in February and the fall in September, the difference between high and low river being 15 to 18 feet. In addition to the annual rise and fall the river here is subject to the daily tidal wave, which causes high water at full and change at about 8h. 30m.; springs rise about 3½ feet, neaps 2¾ feet. This daily rise and fall is chiefly apparent when the level of the water is steady. When it is quickly rising or falling the tidal rise and fall is masked or totally disappears. The zero of the river level gauge at Chinkiang is generally about 18 inches above the winter level of the river.

During high river there is a constant outward flow, accelerated or retarded by the ordinary tidal influence, and reaching a rate of 4 to 5 knots, with occasional freshets of 6 knots. At low river, usually when the Chinkiang water gauge is under about 8 feet, vessels sometimes swing to the flood stream for a short time, but even then the river generally flows toward the sea at a rate of 1½ to 2 knots.

Accessibility.—Chinkiang can be reached at all times by vessels of 27 feet draft.

Anchorage.—The best anchorage is on the right bank; ships should be moored.

Supplies.—Beef is plentiful, and there is a fair supply of mutton; fish of good quality are abundant; vegetables and fruit are cheap. Firewood can be obtained. All kinds of stores are imported from Shanghai by the river steamers, passing several times a week. Game abounds in the vicinity.

Trade.—There are no great manufacturing or other industries at Chinkiang giving employment to the people, nor is the district rich in any of the staple products of China. The position of the port, not far from the mouth of the Yangtze, and at the junction of the leading waterways, especially the Grand canal on the north, constitutes the chief importance of Chinkiang as a trading center.

The low-lyng plains, intersected by numerous creeks and canals, are admirably adapted for growing rice and the higher lands are equal to bearing the finest crops of wheat, peas, beans, etc. Villages and hamlets are scattered over the country, but, excepting Chinkiang itself, there are no large towns. The principal articles of foreign import to Chinkiang are cotton goods, woolen goods, metals, opium, kerosene, sandalwood, sugar, matches, and sundries; and of native products, beans, coal, grass cloth, wood oil, sugar, tobacco, wood poles, etc. The principal exports are beans and peas, groundnuts, hides, lily flowers, groundnut and sesamum oil, rice, silk, etc.

In 1905, the foreign imports were valued at $13,674,530 and the exports at $6,809,175.

In the same year, 3,798 steamers, with an aggregate tonnage of 3,755,146 tons, and 897 sailing vessels, with an aggregate tonnage of 138,922 tons, entered the port. In addition, the inland steam navigation trade amounted to 3,781 entries of 66,792 tons.

Grand canal.—The entrance to this canal has silted up, and is at present closed to traffic.

The Grand canal enters from the river at the upper part of the city, passes along its western and southern sides, and then continues southeastward to Chang chu fu, Suchau, and southward to Hangchau fu. This branch of the canal is closed from want of dredging during low river, or from November to April, between Chinkiang and Chang chu fu; its is always open between Chang chu fu and Suchau.

The northern branch of the canal from Kwa chau, which is opposite and a little above Chinkiang, is navigable for vessels drawing 4 to 5 feet from April to October to Ching kiang fu, a distance of 150 miles; from November to March there are shoals of 2 feet for 3 miles at

Yang chau fu, of 2 feet for 2 miles at Chieh shou, and of 3 feet for 2 miles at Huai chen.

The climate is similar to that of Shanghai, but the hilly surroundings of Chinkiang are an advantage, and are undoubtedly conducive to health. Fever and dysentery, the diseases inseparable from situations of this kind, are prevalent during summer; winter is bracing.

The channel between Kwa chau, where the bank is washing away, and the eastern end of Deer island is intricate, and frequently changes. In making for Saltoun point caution is necessary to avoid a bank that dries, and extends from the right bank, and also a spit running out from the eastern end of Pi sin chau which reduces the width of the passage to about 200 yards.

Pi sin chau light beacons.—A black pole surmounted by a wicker ball on the northern side of Pi sin chau, at ¾ mile above its lower end, exhibits at 51 feet above high water a fixed white light, visible 7 miles.

A similar beacon on Bethune point, the western end of Pi sin chau, exhibits at 55 feet above high water a fixed white light, also visible 7 miles. These lights are occasionally moved according to the state of the banks.

The channel northward of Pi sin chau, although more direct, appears to have irregular depths and to be filled with sand banks; it is subject to frequent alterations. Native boats use this channel at all seasons, but the southern channel is always used by steamers of much draft.

Ichang rocks.—At about 6½ miles above Bethune point and nearly abreast Morrison point, almost in mid-channel, are Ichang rocks, a rocky ledge nearly dry at low water, lying midway between the custom-house of Lung wang miau and that situated at the entrance to the creek 4 miles westward of it; the rocks narrow the channel to 600 yards, and all to the northward of the ledge is shoal. There is a board on two supports on the left bank abreast approximately the eastern end of Ichang rocks.

A shoal with 4½ fathoms on it, but on which a depth of only 2 fathoms was reported in 1900, extends off the left bank of the river from the custom-house at the entrance of the creek above Ichang rocks to about 2½ miles above it.

Cornwallis bluff, on the right bank at 12 miles from Morrison point, is 250 feet high; the Yen tse ke hills are above the bluff, and an outlying rock is said to exist southward of mid-channel between them and the entrance of Tsauhia creek, which is nearly 3 miles above Cornwallis bluff.

The right bank of the river below the creek is formed by the high hills, Wu lung shan.

Mud fort light beacon.—A black pole surmounted by a wicker ball on a low point on the left bank of the river, about 1¼ miles above Cornwallis bluff and marked on the plan as Mud fort, exhibits at 55 feet above high water a fixed white light, visible 7 miles.

Tsauhia island forms the right bank of the river above Wu lung shan; shoal water extends round its northern side, and the left bank of the river must be kept from Mud fort until Pagoda point, the western end of the island, bears about 188°, when the track is in mid-channel.

Theodolite point, the southwestern end of Tsauhia island, is immediately below the city of Nanking.

Tsauhia creek, or Nanking cut-off, runs southwestward between Tsauhia island and the main; it is 3½ miles shorter than the river channel northward and westward of the island, and carries not less than 3 fathoms water. On both sides of the creek entrance are banks extending 200 yards, which are visible at low river, but are covered when the water is high (a formation common to creeks and canals). By regulation of the viceroy this creek is closed to any but native vessels, as some turns are rather sharp and many junks have been run down. A notice in Chinese characters is posted up at each end of the creek.

Nanking, the capital of Kiangsu, the second city of the empire, and the seat of the vice-regal government, is 44 miles above Chinkiang, 198 miles from Shanghai and 230 from the sea.

Nanking was opened as a treaty port in 1899, but, strictly speaking, it has been a treaty port since 1858, for it was expressly named in the treaty of that year concluded with the French at Tientsin. At that time, however, the city was the headquarters of the Taiping rebellion, when it was impossible for foreign merchants to take advantage of their newly acquired rights.

Nanking was till A. D. 1403 the metropolis of the empire and the seat of the Chinese court, for which by its situation it is eminently adapted, and the ruins of an ancient wall which can be traced for 35 miles in circumference testify to its former magnificence. It became noticeable in modern times, in 1842, when the Chinese submitted to the terms of peace imposed by the British force; and later as the headquarters of the Taiping rebellion, the leaders of which took the city by assault on March 19, 1853, and continued to hold it until July 19, 1864, when it was recaptured by the imperial troops. The rebellion left the city with its population annihilated, its trade entirely destroyed, and itself an almost uninhabited desert; even after 30 years of peace the city still bears witness to the terrible struggle of which it was the scene.

The city is surrounded by a wall of irregular, triangular shape, 25 miles in circuit and from 50 to 70 feet high, with now 6 gates. A very small part of the space inclosed has been built on, and there is much park-like woodland and waste within the city. The inhabited portion lies toward the east and nearly 5 miles from the river.

There are hills of some elevation, particularly on the western side, where the scarped sides of the crooked line of heights form a natural wall of red sandstone. Between the western wall and the river are a series of moats and fish ponds. A moat also runs from the river to the western gate, and continues along the wall to its southwestern angle; the southern gate is under the steep hill without the city and near the site of the once celebrated porcelain tower. The Taiping gate is on the northeast side, under the hills, where are the ruins of the remarkable tombs of the Ming dynasty, near the eastern end of a large sheet of water, banked in by masonry.

The viceroy, besides having the three important provinces of Kiangsu, Anhui, and Kiangsi under his jurisdiction, is also superintendent of southern trade, a position which makes him the most powerful official, outside Peking, in the Empire.

In 1866 the Nanking arsenal was established outside the southern gate of the city, and this was the forerunner of many institutions set up on foreign lines by the authorities of Kiang nan, among which are the naval and military colleges and the Kiang nan mint. Several missionary societies have made Nanking a center from which to carry on their work, and the city is the literary capital of China and has several large libraries and printing offices.

A settlement for foreign residents has been marked out near the northern gate of the city outside the walls and along the river bank. It is a suitable site for commercial purposes, but at present too unhealthy for European habitation, and nearly all the foreigners at Nanking reside within the walls. A house is to be built for the British consul on the opposite side of the Ma lu to the naval college.

The port of Nanking is known as Hsia kuan, and it is situated close to the northwestern corner of the city wall and between it and the river. A foreign made road, 30 feet wide, leads from the river bank to the Tung chi gate, enters the city by the Ifeng men gate, and traverses it for its entire length, a distance of about 8 miles. The river steam vessels go alongside hulks which are connected with the shore by pontoons and bridges. A portion of the bunded frontage of Hsia kuan slipped into the river in January, 1903, and there is now a bay with a depth of several feet where the bund was.

Nanking has the reputation of having a peculiarly unhealthy climate, malarial fevers being prevalent owing to the surrounding marshes, but it is unhealthy only in summer, when the missionaries and those Europeans who can do so leave the city; the winters are cold and bracing. During July and August the temperature has reached 99° in the day, 90° at night, and mosquitoes abounded. The population is estimated at 300,000.

The government schools and colleges, established during the last few years, train a large number of candidates for the civil and military services.

There is no European cemetery at Nanking. In case of death on board ship the funeral must take place at Chinkiang or Wuhu. In 1904, the only European doctor was a missionary, who resided about 6 miles from the bund.

Communication.—A railway to Shanghai via Suchau is under construction.

Nanking can be reached at all times by vessels of 27 feet draft.

Anchorage.—The anchorage off Nanking is on the right bank southward of Theodolite point in 11 to 26 fathoms, muddy bottom, good holding ground, and as close to the shore as convenient; the stream there being not so strong as farther out. There is also anchorage off the left bank, where the stream is weak, in 7 to 10 fathoms.

Chinese men-of-war anchor near the mouth of the canal at Hsia kuan. Foreign men-of-war usually anchor a little above the customhouse and about 600 yards distant from the nearest hulk, in order to leave room for the river steamers to go alongside, but as the water is very deep there they sometimes anchor near the opposite bank, where the water is much shallower and there is better shelter from northerly winds.

It is advisable to moor to prevent sheering in strong northeasterly or northwesterly winds; and also during the high-river season when the current is very strong.

During high river owing to the rapid current and the consequent silting up of the bottom it is necessary to sight the anchors about once a week; with the fall of the river and a decreasing current a longer time may be allowed; and at low river in winter it is unnecessary to lift the anchors at all.

Landing.—The landing places at Nanking are all bad and unsuited for steamboats. The current is not too strong for pulling boats, and the stream is generally slack close inshore.

With northerly winds a very nasty chop is caused, which renders boats liable to be swamped when lying at the booms.

Trade.—In 1905, 1,824 steamers and 228 sailing vessels with an aggregate tonnage of 1,987,808 tons entered the port. The inland steam navigation trade amounted to 423 entries with a tonnage of 7,830 tons.

Tides.—It is high water, full and change, at Nanking approximately at 11h. 0m.; the range of tide is about 4 feet at spring tides in winter, when ships swing to the flood stream for a short time. During summer the tides are masked.

Water.—The water of Nanking is abominable and is the cause of much sickness.

The reach from Nanking to Hea san shan bluff, 13 miles in length, is clear in mid-channel, but a good berth must be given to the shoals which extend from Wylie point, the upper end of Me tse chau island, and join the mainland at the first creek southward of the point. In summer the stream sweeps past Wylie point at a great rate, causing much chow-chow water. The creek eastward of Me tse chau is chiefly used by junks.

Elgin reach.—Hea san shan, a bluff on the right bank, is 350 feet high; abreast it shoal water extends off the left bank to nearly mid-channel; this shoal water extends from 2 miles below to 2¾ miles above the bluff, after which the left bank is steep with deep water to Rosina rock.

The right bank between Hea san shan and Rocky point, a distance of 4 miles, is reported rocky, and a rock lies about 300 yards off the right bank at 1$\frac{3}{10}$ miles above Hea san shan bluff.

Above Rocky point is a small low island with foul ground between it and the river bank; and immediately farther up is Pheasant island, also low and nearly 4 miles long. Shoal water extends 1,600 yards from Rocky point, and a long spit runs out from the northern point of Pheasant island.

From about 1¾ miles below the southern end of Pheasant island to a similar distance above it the deep-water channel is narrowed by shallow water extending from the right bank.

Pheasant island channel, between Pheasant island and the low island and the right bank of the river, is only used by junks and small steamers, being narrow, very rocky, with chow chow water, and it is not recommended.

Rosina rock is 70 yards off the point of the left bank in front of a small bluff on which stands a conspicuous watchhouse, 10 miles above Hea san shan.

Light-boat.—A light-boat, having one mast and a ball, is moored 400 yards 203° from Rosina rock, and exhibits a fixed red light visible about 4 miles. Vessels bound upriver pass the light-boat on their starboard hand at a distance of not less than 200 yards.

Gross island, the northern end of which is about 1 mile above Rosina rock, and May Queen island, close southward of it, are 6 miles in length. May Queen channel, between these islands and the left bank of the river, is now closed.

May Queen island—Light-boat.—A new channel, known as Yiksang channel, has opened between May Queen and Gross island.

A light-boat has been established off the southwestern point of May Queen island.

Wade island is immediately above May Queen island, and Jones and Lee islands are on its southern side; these islands extend about 8 miles up the river. There is a conspicuous clump of trees near the northern end of Wade island.

Light beacon.—A black pole surmounted by a wicker ball, on the western side of Wade island about 1,400 yards from its northern end, exhibits at 52 feet above high water a fixed white light visible 7 miles, to mark the northeastern end of the new Wade Island crossing, and a new fixed red beacon light, to be known as Hochow beacon light, will be established on the left bank of the river to mark the southwestern end of the crossing.

Directions.—Vessels bound up the river should follow the western shore of Wade island until 800 yards above Wade Island beacon, then steer across the river on a line joining Wade Island and Hochow beacons, keeping these beacons bearing 50° and 230°, respectively. A small tree is in line with Wade Island beacon on this bearing. When about 700 yards from the left bank of the river haul upstream on a 181° course.

If these directions are followed, the least water found in the channel at present will be 12 feet, reduced to zero of the Wuhu River gauge.

Susquehanna channel, between Wade island and May Queen island and the left bank of the river, has again deepened and is the channel now in use.

Gallows channel is shoaling, and the light-boat, formerly moored at its southwestern entrance, has been withdrawn.

The Pillars, 4 miles above Wade island, are two rugged, fortified eminences 250 feet high on either side of the river, into which the eastern one projects considerably. Tien mun, the pass between them, is deep and clear up to Morton point.

Morton point is 3¾ miles above East Pillar on the same bank. Abreast it the channel, carrying only 4 fathoms, is greatly contracted by Dearborne island, a flat island 2 miles in length lying in the middle of the river. The northern part of this island should be kept aboard, as rocks with 18 feet of water at low river extend about 400 yards off the bank at 1,000 to 1,400 yards northward of Morton point.

The flood waters of summer find their exit by Friends channel, a circuitous bend westward between this island and another northward of it and West pillar, but this is generally closed at its upper end in winter.

Wuhu light beacon.—A black pole surmounted by a wicker ball, on the right bank of the river at 2½ miles above Morton point, exhibits at 77 feet above high water a fixed white light, visible 7 miles.

From abreast the southern point of Dearborne island keep the summit of the 500-foot hill at Morton point astern bearing 6° until Wuhu beacon bears 122°, to avoid the spit extending southward from Dearborne island, and then turn into mid-channel to clear a rocky ledge, which uncovers 11 feet in winter, about 200 yards from the right bank, with shoal water outside it, lying off Wuhu beacon, and for about 600 yards above it.

There is a rocky ledge 1¼ miles below Wuhu, close to the right bank, and a large shoal, drying in places at low river, extends off Wuhu and for a mile southward of the creek, over halfway across the river, with 1½ fathoms on its western edge.

Wuhu, a walled city 52 miles above Nanking, is situated about 1½ miles inland on the borders of a canal, and it extends outside the walls to the bank of the river. It is a treaty port. The most noticeable marks are the British consulate, the two pagodas, the 256-foot hill, the missionary stations, Roman Catholic cathedral, and the commissioner of customs' house. The country about Wuhu is not wooded. The canal is a clear stream of water falling into the Yangtze by the low pagoda.

A foreign settlement is being laid out on the river front between the American Methodist mission and the city.

Accessibility.—Vessels of 27 feet draft can reach Wuhu in summer, and of 16 feet in winter.

Anchorage.—The British river steamers belong to four companies, each of which possesses a hulk at which vessels moor to load and discharge cargo, and there are three other similar hulks. Owing to peculiarities of current, depth, etc., it is not practicable to connect these hulks with the shore by means of pontoons, and the channel inside the hulks, although obstructed by a sand bank, is made use of by large rafts. These have sometimes a draft of 15 feet and are not uncommonly very carelessly navigated; consequently collisions occur. The best anchorage is outside the line of the hulks, leaving room for the river steamers; the holding ground is good, being mud and clay; vessels making a stay moor, but it is not necessary to continually sight the anchors. Cables should be ready to veer if required to clear timber rafts.

On account of the danger to shipping lying off Wuhu, due to large rafts drifting down, a red and white square flag is hoisted at the British consulate flagstaff a few hours before any are expected to pass.

Tides.—It is high water, full and change, at Wuhu at 3h. 0m.; the rise at springs in winter is about 2 feet. Ships swing to the flood in January and February, then to northerly winds until the river begins to rise.

Stream.—The rate of the stream is very irregular and greatly influenced by wind; it averages 1 to 2 knots in winter and 5 knots in summer.

Immediately abreast of Wuhu pagoda the stream sets in strong eddies, necessitating the greatest care on the part of the pilots, especially at night.

Trade.—The trade of Wuhu is entirely with Shanghai and the other treaty ports. The principal articles of export are beans, cotton, feathers, ground nuts, hemp, hides, maize, paper, rice, sesamum and rape seed, silk, wheat, etc.; the articles of import are opium, cotton, and woolen goods, bags, oil, sugar, etc., and native goods consisting of cloth, cotton yarn, beans, sesamum and wood oil, silk goods, wood poles, etc.

In 1905 the value of the foreign imports amounted to $5,519,925 and the exports to $15,934,255.

In the same year 2,249 steamers and 233 sailing vessels, with an aggregate tonnage of 3,090,750 tons, entered the port. The inland steam-navigation trade amounted to 645 entries, with a tonnage of 8,983 tons.

Coal is not usually kept in stock, but could be obtained from Kiukiang.

Communication.—There is daily communication with Shanghai by steamer.

Supplies.—Provisions of good quality can be obtained in abundance, but there is no good water.

Hospital.—There is a missionary hospital at I chi shan, distant 1½ miles, but cholera cases are not admitted.

Climate.—The climate of Wuhu resembles that of Shanghai. The temperature ranges from 20° to 100°; in summer the average temperature is 81°; in autumn the weather is cool and pleasant; in winter and spring sudden changes in temperature are common, the thermometer standing between 60° and 25°. In December and January northeasterly winds are extremely raw and chilly. In 1905 the rainfall at Wuhu amounted to 63¾ inches.

From Wuhu to Lang kiang ki (Hen point), a distance of 90 miles, both from the strength of the current and the intricate navigation at many parts, the river presents very considerable difficulties.

From Wuhu continue at a moderate distance from the left bank of the river, and after passing Lukiang village keep in mid-channel, but pass rather nearer to Shansi point. This point is reported to be growing out southward and eastward.

Shansi light beacon.—A beacon, a pole surmounted by a ball, on Shansi point exhibits a fixed white light, visible 7 miles.

Haines bank extends off the right river bank from opposite Shansi point to Haines point, which is 4½ miles farther up. It is said to be growing out northeastward.

Haines point light beacon.—A black pole surmounted by a wicker ball, on the right bank of the river at Haines point, exhibits at 30 feet above high river a fixed white light, visible 7 miles.

After rounding Shansi point keep the left bank aboard to Phi ma tsui town, thence the best water is in about mid-channel as far as Yangkeatsui, 5½ miles above Haines point.

Sanshan creek is a cut-off of 2 miles, used in summer by vessels of light draft; it is stated to have 2 fathoms throughout and a bar of 10 feet at either entrance. The creek is 300 to 400 yards wide, and on its banks are few small villages. The lower entrance is opposite Shansi point.

Kieu hien is a town on the right bank of the river, 3¾ miles above Yangkeatsui and 3 miles northward of the Ta hwa shan, a range about 1,500 feet high. There is good anchorage in 5 to 8 fathoms off the town. Lake Chaou, northward of Kieu hien, is an extensive sheet of water, which has two or three outlets on the left bank of the river, the principal of which is opposite Haines point.

Osborn reach.—From Yangkeatsui keep in mid-channel, passing southward of Barker island, which is a complete flat 6 miles in length.

The Governor-General channel, northward of Barker island, is closed. At the southwestern point of Barker island is a beacon, and a shoal extends nearly 1 mile off it. At the western foot of the Ta hwa shan range, Pants ki rock rises steeply 80 feet from the eddying stream, surmounted by the gray mossy ruins of a temple and pagoda embowered among trees. The hills of the range here rise from the water's edge in grassy slopes partially wooded, with richly timbered valleys. Ta hwa shan range runs southwestward for 20 miles to the Wild Boar hills, but the river runs considerably westward of the intermediate part of the range.

One mile above the Pants ki rock is Tei kiang village, with its three-arched bridge of heavy masonry over a creek with a shoal off it, and its white but partially ruined houses clustering up the hillside or nestling among the trees at its base. One mile above the village the river abruptly leaves the range and takes a westerly direction along Lan wan bend for 6 miles. Keep toward the right bank along the bend, the left bank of which is very shallow at the western part.

Horseshoe bend, a channel which turns northward round Horseshoe Bend island at the western end of Osborn reach, is not now used.

Tangling chis channel (Two Fathom creek), southward of the island forming Horseshoe bend, is now used by large ships. The course is closed to the right bank until past the shoal off the southern end of Horseshoe Bend island and then along the south coast of that island.

Tangling chis channel light-boat.—A boat, painted red and having one mast and a ball, is moored at the lower end of Tangling chit channel and exhibits at 25 feet above water a fixed red light, visible 4 miles. This boat marks the starboard side of the channel for vessels ascending the river.

Tangling chis channel light beacon.—A black pole surmounted by a wicker ball, on the left bank of the channel near its western end, exhibits at 34 feet above high river, a fixed white light visible 7 miles.

From the western end of Tangling chis channel the course is along the left bank of the river.

Williamette channel, a cut-off of less than 2 miles, and which is used by steamers when the water is at 28 feet, has its entrance at Tsin kia chin, at the western part of Lan wan bend. It is very serpentine, with deep water round the bights and shallows off the points, and the western entrance is shoal. Its upper outlet at Perkins point is sometimes shallow, and at other times steep-to.

Chachau light beacon.—A black pole surmounted by a wicker ball, on the left of the river at Chachau, just below the creek, exhibits a fixed white light, visible 7 miles.

Wild Boar reach takes a southerly course above Chachau light. There is high land on the left bank of this reach, the first rising ground on this side of the river above the Pillars, a distance of 50 miles.

The principal channel is westward of Buckminster island; a spit extends off the northern end of Chinte chau, which is the northern part of Buckminster island. Chachau village, on the left bank and 1 mile from the river, is surrounded by a white wall, but ruins extend from the wall to the river; a shoal is said to have formed across the river abreast the village, on which there is a depth of 3 fathoms at low water. The reach is clear for the next 10 miles. A conspicuous bluff, 100 feet high, overhangs the stream at 4 miles above Jeffrey island, and on its wooded summit is the ruined temple of Kiang shan ki, in passing which mind the helm, on account of the current; close it somewhat and also the western side of the flat island Tatung lying off the town of that name.

Kiang shan ki—Light.—A fixed white light is said to be regularly shown from the pagoda at this place.

Having passed the channel between Tatung and Thompson islands, edge over to the left bank, avoiding the spit which extends southwestward from Thompson island.

Fitzroy Island light beacon.—A black pole surmounted by a wicker ball, on the left bank of the river at about ¾ mile below Fitzroy island, exhibits at 32 feet above high river a fixed white light, visible 7 miles.

Fitzroy island lies above the beacon and is about 3½ miles in length; on its southern side and separated by a channel 800 yards in width is Low island; this channel is now closed. New island, close northward of Fitzroy island, is rapidly extending. Banks sometimes form suddenly in this vicinity.

It is reported (1899) that the best channel now is that southward of Low island, and that it has a least depth of 18 feet. A shoal extends off the right bank below the channel. For this channel pass about 400 yards southeastward of the eastern end of Fitzroy island, then steer into the channel and keep on its right bank till about 1 mile from the light-vessel.

For the northern channel on approaching Fitzroy island, close the left bank and follow it around till nearly up to the creek opposite the southwestern point of the island, when keep about 600 yards from the left bank.

In 1906 the north channel had a least depth of 12 feet, reduced to the zero at Wuhu.

The south channel had, in 1904, a least depth of 14 feet.

Light.—A fixed white light is said to be regularly shown from a pole near the joss house on the western side of the 70-foot hill situated about 3 miles to the northeastward of Tai tzu chi.

Fitzroy Island light-boat.—A boat, painted red and having one mast with a ball, is moored on the northern edge of a shoal at the upper end of the southern channel, and exhibits at 25 feet above water a fixed red light, visible 7 miles.

The boat marks the port side of the southern channel in ascending the river.

The river again becomes clear at about 1 mile above Low island, when a mid-channel course may be steered for the next 3 miles, then keep near the left bank, avoiding a ledge of rocks which extends 50 yards off it at high river just under a small rise of 70 feet, and opposite which is a small low island with a shoal extending from it in line with the river bank for 1½ miles above Tai tzu chi, a conspicuous rocky island 30 feet high, which appears to lie almost in the middle of the river.

About 1½ miles above the 70-foot rise is a small tributary of the Yangtze, on passing which steer to pass 400 yards northwestward of Tai tzu chi to avoid a shoal (dry in December) which fronts the left bank and bight of the river for an extent of 3 miles, and the edge of which is in mid-channel.

Tai tzu chi light beacon.—A black pole surmounted by a wicker ball, on the northwestern side of Tai tzu chi temple, exhibits at 26 feet above high river a fixed white light, visible 7 miles.

From 400 yards northwestward of Tai tzu chi rock steer about 224° till Tai tzu chi is just open northward of the hills on the right bank, then steer 213°, and when the beacon on the left bank bears 185° steer for the wreck light-boat. The rocks near Observation spot are 150 yards from the shore at high river and dry at 14 feet; the sand bank is very steep and dries at 20 feet.

Tai tzu chi—Light-boat.—A native boat, with one mast surmounted by a ball, marks the spit off the mouth of the stream to the westward of Tai tzu chi. It exhibits, at an elevation of 25 feet above the water, a red fixed light. Vessels bound up the river should leave this light-boat on the starboard hand.

Lang kiang ki (Hen point), 100 feet high, is dangerous, as a barrier of rocks, parts of which are above water, extends from the point more than halfway across the river. To avoid this dangerous spot, the Chinese have cut a channel on the right bank, called the "No yang," which dries across the southern part when the water is at 14 feet. It is used by junks.

When rounding Hen point there are sometimes very strong eddies, and care is necessary with the steerage in passing through the chow chow water, which has nearly turned a large vessel around and run her ashore before the helm could take effect. The eddies are strongest about abreast the rocks.

Kiang lung rock, over which the least depth is reported to be 9 feet, lies right in the fairway, a little below Hen point. Tai tzu chi, well open of the point until Hen point beacon bears 189°, clears the rock. Rocks extend off Hen point as far as the rock on which is the wreck of the *Kiang lung*, and which is well westward of the middle of the river.

Kiang lung wreck light-boat.—A red light-boat, having 1 mast with a black ball, moored near the left bank of the river, abreast of *Kiang lung* wreck, off Hen point, marks the western side of the channel, and it must be passed closely to avoid the wreck, which is on the eastern side of the channel. It exhibits at 25 feet above the water a fixed red light, visible 4 miles. *Kiang lung* wreck dried in 1880 when the water was 3 feet at Kiukiang.

Ngan king reach, which carries 3½ fathoms, is opposite the lower end of some sandstone cliffs, nearly 4 miles above Hen point, and is entered by the channel northward of Jocelyn island. From the cliffs keep the left bank aboard until Eagle island beacon bears 179°, when cross over and keep about ⅓ the width of the river from the right bank, but do not go into the bight above the beacon.

Chuan-Kiang-Kau beacon light is fixed red and shown from the point north of the eastern point of Jocelyn island.

Ngan king, the capital of Anhui, is an extensive walled city standing on the left bank, upon ground considerably raised above the surrounding country. The river side of the walls is fully 1½ miles long; the extensive suburbs which once existed are now in ruins. Ngan king pagoda, situated close outside the eastern end of the city wall, is the finest of the pagodas on the river.

Coal.—It is stated that a coal field of great magnitude and giving fuel of very high quality, situated close to Ngan king, will shortly be worked.

Eagle island light beacon.—A black pole surmounted by a wicker ball, on the right bank of the river near the point opposite Ngan king, exhibits a fixed white light, visible 7 miles.

There is a very conspicuous tree westward of Sandy point, on the left bank, 4 miles above Ngan king, which is a good guide, as it can be seen almost immediately after passing Ngan king, for the land is low and bare. Sandy point has a spit which must be approached with much caution as it is extending eastward; a 201° course from the two small trees above Ngan king clears it.

Christmas island.—The river divides round Christmas island, which is 4½ miles in length, and the most direct course is eastward of this island. In taking this channel keep the right bank aboard, avoiding the northeastern point of the island.

The channel westward of Christmas island is never taken, and its present state is not known. It was formerly a deep channel running westward from Sandy point till after rounding Rover island.

Christmas island light beacon.—A pole surmounted by a ball is situated at the southern end of Christmas island. From it is exhibited at an elevation of 34 feet above high water a fixed white light, visible 7 miles.

The light-boat, formerly moored at the upper end of Christmas cut-off, has been withdrawn.

In 1904, the channel west of Christmas island was almost entirely blocked.

Christmas cut-off is a narrow passage eastward of Low island, and is generally used when going up the river, but it is considered too narrow on the way down on account of the number of junks anchored there, when the passage between Christmas and Low islands is taken.

Tung liu reach.—Above the bank extending southward of Low Island keep in mid-channel, keeping over to the red bluffs of Hwang shi ki, 3½ miles above, and gradually gaining the right bank, which may be followed up to Tung liu island. Above Christmas island there are flats on both sides, but above the bluffs the deep water is along the righ bank, and nearly the whole reach is filled with a succession of middle grounds; Tung liu island, covered with bushes, opposite Tung liu city, was recently a shoal; its northern end appears to be washing away.

Tung liu island light beacon.—A pole surmounted by a ball about ½ mile within the northern end of Tung liu island exhibits a fixed white light, visible 7 miles. A small white house with red roof stands close to the beacon.

Tung liu, a third-class city with rather formidable looking walls, stands a little back from the right bank of the river, from which it is separated by a plain ½ mile broad. The wall dips and rises over undulating ground, and finally descends to the waters of a lake which half encircles the town, and is fringed with trees. The surrounding country produces wheat, millet, rice, cotton, hemp, potatoes, and inferior tea. A pagoda of 8 stories stands on a point of the river northward of the town. Give this point a good berth, as although shallow water was not obtained there, a great commotion was observed in the stream, apparently caused by some rock or check.

A series of middle grounds, dry in December, extends for 7 miles above Tung liu. These dangerous banks will have been passed when the two trees below McQueen's rock bear eastward of 179°.

The channel westward of Tung liu island and the series of middle banks is used during summer, but when the river is low the channel eastward of them is buoyed and used by all river steamers.

The greatest care is necessary when navigating the river between Tung liu and Hwang yuen chin (where there is a custom-house with joss poles), for the rocks are numerous along the right bank. The rocks off the point 2 miles above Tung liu reduce the width of the channel to 400 yards, Rocky point, 2 miles farther on, dries at 100 yards offshore, with the water at 27 feet. Spencer rock is about 5½ miles above Tung liu, about 100 yards from the right bank, and has 6 feet water on it when the water is zero at Kiukiang.

Tung liu reach light-boat.—A native boat, having one mast and a ball, is moored during low river, or from about November to May, off the upper end of the spit near Spencer rock, and exhibits, at 25 feet above water, a fixed white light, visible 7 miles.

The boat marks the port side of the channel when ascending the river.

A bank studded with rocks extends for more than 150 yards off the right bank from Spencer rock to the creek opposite Hwang yuen chin; the chief of these, McQueen's rock, dries at 8 feet. On the left bank, between Hwang yuen chin and Dove point, at the upper extremity of this reach, which is 26 miles above Christmas island, and northward of Hwang yuen chin creek for 3 miles, a large shoal has formed, which at its central part abreast the creek extends for ½ mile from the shore, but the point itself is steep. The right bank must therefore be kept here.

On the right bank of the river in this vicinity there are high ranges, but the left is quite a flat; and although the river banks are, in November and December, 25 to 30 feet high, the country shows signs of being frequently inundated. Sampans are found at most of the farmhouses as far as 4 miles inland, and indicate the state of the country when the river is high.

The whole of the left bank and large portions of the right are then covered, the river becoming a large lake, and under these circumstances it is advisable, as a rule, to keep in the most rapid part of the current, for it always runs strongest in the deep water.

Bullock reach.—At Dove point, off which are strong eddies, the river takes a sudden turn northwestward or at right angles to its former direction, and gradually curves south-southwestward, from which it varies little for the next 10 miles. This channel is not now used.

Matung channel.—From Dove point the channel used for navigation is between Dove and False islands, thence between Pigeon island and Matung. There is a sharp turn round the cliffs, about 300 feet high, near Matung, where is very strong chow chow water. From Matung pass close northward of Snipe island (the island southward of Pigeon island) and continue about west-southwestward until the passage opens clear of Siau ku shan, then keep southward in mid-channel. There is reported to be a least depth of 5 fathoms at lowest river in this channel.

In 1906 a bank had formed to the eastward of False island, which extended as far eastward as a line joining the southeast point of Dove island and the joss house on the opposite (right) bank of the river.

A bank, which is uncovered, extends from the southeast point of Grass island in a southerly direction, which, with the bank above mentioned, much narrows the navigable channel in this locality.

Siau ku shan (Little Orphan), a remarkable rock, rising almost perpendicularly out of the river to the height of nearly 300 feet, is near the southern termination of Bullock reach. It has some joss houses on its summit, and half way up its southern face is a Buddhist temple. The rock was connected with the left bank by mud, but is now some distance off, as a good deal of the bank has been washed away.

Immediately opposite the Little Orphan, at the foot of the broken range King tse shan or the Mirror mountain, a bold rocky head, crowned by forts and lookout houses, rises abruptly to a height of 100 feet; and 2 miles above, where the hills of the right bank again come down to the water's edge in rocky promontories, is the fortified town Pang tsis hien. In passing the Little Orphan (off which a bank extends for 200 yards) steer in mid-channel until Pang tsis hien is passed, when the channel lies near the left bank.

Blakeney reach.—Several changes are reported to have recently taken place in this reach.

Northeast crossing light beacon.—A black pole surmounted by a wicker ball, on the south bank near the lower end of Blakeney reach, exhibits, at 34 feet above high river, a fixed white light, visible 4 miles.

Light-boat.—A light-boat having one mast surmounted by a black ball, moored near the lower end of the sand bank in Blakeney reach, exhibits, at 25 feet above the water, a fixed red light, visible 4 miles. The light-boat is moored about 3 miles above Northeast crossing light beacon, and indicates the channel when the banks are covered. It is only in position during high river or from about July to November.

The boat marks the starboard side of the channel when ascending the river.

Otter point light beacon.—A black pole surmounted by a wicker ball, on the northeastern end of Lay island, at the junction at the head of this reach, exhibits a fixed white light, visible 7 miles.

Poyang junction.—At the head of Blakeney reach the Yangtze receives the tributary waters of the Kan kiang, which discharge through West Poyang lake. The channel from West Poyang lake continues directly into Blakeney reach, while the Yantze falls into it by three channels, one of which is almost at right angles to its lower course, opposite a village standing at the foot of the sand-fronted range on the right bank.

Hukau.—On the eastern entrance point of Poyang lake and upon the summit of the steep cliffs of Tsa chi or the Jagged head, stands Hukau (Lake mouth) city; this city has apparently little trade, but is the depot for all the war junks on the upper Yangtze. These junks lie inside a very good camber; there were over 60 of them in it in 1899, and it is said that about 400 of them are attached to the port. Two or three gunboats could lie inside the camber at high river. A British steamship company has established a passenger agency at Hukau.

The walls of the town of Hukau inclose a very large area, as they are carried up onto the hills behind, but only the small level space by the shore is occupied by buildings. Besides the Shih chung shan temples, situated on the rocky headland of that name, there are several other large temples or monasteries within and without the walls, with groves of trees in the valleys on the hillsides that give a pleasant appearance to the town as seen from the lake. The population does not probably exceed 10,000.

Between the town and the headland next southward is the camber for junks. Hukau is the headquarters of the river police for the section of the Yangtze extending from Yo chau to Anching.

West Poyang lake extends from Hukau about 30 miles in a direction a little to the westward of south, with a width that varies very much at different points and at different seasons. At low water in winter the greater part of the area consists of dry sand banks, through which a river of no great width winds its way to the Yangtze.

The entrance at Hukau, except during high floods, is narrowed to about ½ mile by a long spit of low land, on the extremity of which stands the west Hukau fort. The eastern shore of the entrance rises almost from the water in abrupt hills. It is probable that vessels drawing 10 feet could visit any of the places on the lake at high river and possibly at other times. The channel up the lake to Ta ku tang is about 600 yards wide. The numerous fishing stakes, which are nearly always placed in the deepest water, may serve for finding the channels.

There are many beautiful and populous islands on the lake, and its fisheries are said to be important. Besides the Kan kiang, numerous other streams fall into the lake from the rich black tea districts to the westward, and the rivers flowing from the eastward are connected by canals with the streams traversing Fychau, Moyune, and the green tea districts, which are thus accessible from this lake. Consequently the lake is the center of a most extensive network of river and canal communication.

The eastern shore of the lake, from Hukau to Lao yeh miau, consists of a series of elevated headlands with bays between. These headlands are lower than the hills immediately behind Hukau, but they serve to obscure to some degree the extent of the intervening bays. Behind these bays the country is hilly or mountainous, rising in places to considerable ranges and conspicuous distant peaks.

The western shore of the lake is at first flat with a small isolated range of hills a mile or two back, and behind that again the region of undulating ridges that extends to Kiukiang; but, as on the eastern shore, there are several inlets which swell into large bays at high water.

Taku tang, on the western side of the lake at 2 miles above Ta ku shan, the Great Orphan rock, is the lowest place on the lake which affords good anchorage. Here large numbers of junks anchor laden with produce from the country, and although it is 23 miles by water from Kiukiang it is but 9½ miles by land, and there is a good road between the two places by which merchandise frequently proceeds, as it can reach Kiukiang by this route in as many hours as weeks are sometimes required by the junks in summer.

Taku tang, though little more than a large village, is of importance as being the place where tonnage dues are collected on junks leaving the lake. The custom-house has been taken over by the imperial maritime customs.

Ta ku shan, or the Great Orphan, is a remarkable rocky island situated on the eastern side of the deep channel through the lake at about 2 miles to the northeastward of Taku tang. Its southern extremity is a nearly perpendicular cliff, actually overhanging in places, some 200 feet in height, and its sides in all directions are very steep. The summit is crowned by a conspicuous pagoda, near which are temple buildings and clumps of trees.

Nan kang, about 15 miles within Taku tang, is a very dilapidated town with apparently no trade.

The lofty and precipitous range Liu shan, or Mule mountains, 4,500 feet in height, extends along the western side of the lake between Taku tang and Nan kang.

Off Tomishan is Widow's rock, marked by a spar beacon, and round Laoyeh miau is the channel, about a mile wide, to East Poyang lake, which is bigger than the West lake, and mostly dry at low river, but intersected by small streams.

In the great flood of 1901 the rivers that feed the lake and the lake itself rose more rapidly and more destructively than the Yangtze, though they returned sooner to their normal channels.

From Taku tang southward to beyond Nan kang spurs and foothills of the Liu shan constitute the western shore of the lake for a distance of over 20 miles. The higher ranges rise in two places to about 5,000 feet and dominate the entire landscape.

On the lake shore, and almost in the shadow of the mountains, is the little town of Nan kang, which enjoys a situation of remarkable beauty. For the capital city of a prefecture it is, in its present state, a very poor place. It was desolated by the Taipings in 1856 and has never recovered from the disaster.

Two pagodas on the headland east of the town are conspicuous landmarks. The harbor faces south and is protected by a double line of breakwaters, of which the outer, being wholly covered when the lake is at anything like a high level, must be rather a danger to navigation.

The industries consist of quarrying slate and kaolin.

Lao yeh miau.—Leaving Nan kang, the channel crosses to the neighborhood of a remarkable headland on the east side of the lake known from a temple near its extremity as Lao yeh miau. There is no village, only a temple and one or two huts, but the place is used as a shelter by junks in bad weather.

Chuki.—Opposite and somewhat to the southward of Lao yeh miau is a similar but rather lower headland called Chuki, also composed of red sandstone hills almost buried in a covering of drifted yellow sand dunes.

One day a strong stream may run from the lake into the Yangtze sufficient to bank up the river; a little later it may cease or run in the opposite direction into the lake. Without knowing the actual and recent weather conditions, not only in each of the many valleys that feed the lake, but also up the Yangtze, it is impossible to state how much water is likely to be found in any part of the lake or how the current may be running.

The natives appear to have very little knowledge of the channels at low water in the Poyang lake, and very little traffic is carried on except by small junks.

East Poyang lake.—The two headlands, Lao yeh miau and Chuki, may be regarded as marking the southern end of West Poyang lake and the commencement of a region whose natural features are very different from those of the country hitherto traversed.

Instead of a narrow depression between shores that are generally high, with a background of mountainous country on both sides, only broken by occasional small plains and valleys, we enter what has been described as a gigantic snipe marsh. There are occasional points of high rocky land and many islands, some of which are inhabited and cultivated in parts, but the bulk of the area is one in which very low land and shallow unnavigable water are so inextricably mingled that it is difficult to say where one ends and the other begins.

At seasons of high water the whole is a lake interrupted by occasional islands, either sand dunes or embanked rice lands, as the case may be, extending westward to the horizon, and southward and eastward very much farther than the horizon. At seasons of very low water the whole is a vast plain of alternate reed fens and sand, through which meander a network of winding, sluggish, and shallow rivers. To make a chart of it would be a labor of great difficulty and little value, for a different outline of every bay, headland, island, and channel would be required for every variation in the water level. In many parts of the lake, but especially in the triangle formed by Nan kang, Tu chang, and Wu ching, both the islands and the neighboring headlands on the mainland are largely composed of recent sand accumulations. The land is almost devoid of vegetation, though here and there it supports a few scattered and stunted fir trees. Those portions of the islands that are not buried in sand are fertile, cultivated, and permanently inhabited.

The level of the lake, and still more of the rivers that feed it, rises and falls with great rapidity. Apparently it takes several days for the level of the entire mass of water to adjust itself, for at Nan chang on the Kan river in 1901 the water fell 10 feet in 24 hours on the same day that the water was rising in the Yangtze, and at Kiukiang attained the highest flood level on record. Two days later it had hardly begun to fall at Zhao chau fu, the town and neighboring country being deeply inundated.

Tu chang hsien, situated on the northeastern shore of East Poyang lake, is a walled town, the wall being 3 miles in circumference. There is little trade; many junks pass through on their way to Zhao chau fu and other places. The principal products are tobacco and millet.

There is a very fine sheltered harbor, a large portion of which dries in winter.

Peh ho.—This river runs for 10 miles or more into the lake between winding banks of reeds, and its mouth is obstructed by a bar or flats, but the river itself once entered is deep. The channels over the flats in the approach to the river do not exceed 20 yards in width, with a depth of 3 or 4 feet, with the Kiukiang water level at 26 feet. The landmarks are two long lines of low red sandstone banks on the south, and a ridge of relatively high land to the north and east, on the extremity of which stands the village of Shwang kang, with a pagoda.

The Chinese pilot of H. B. M. S. *Teal*, 1903, stated that there is a difference of 20 feet between the winter and summer level of the river, but this is probably a very rough estimate.

Zhao chau fu (Jao chao).—The town extends for about 2 miles along the north bank of the river, but for no great distance inland. The western half in former times was inclosed by walls, but of these walls very little beyond the foundation remains. With the exception of a little rising ground to the northwest the whole place is on the level of the river bank and liable to inundation. It is the capital of its prefecture, and probably contains about 40,000 inhabitants.

Steam launches run between Kiukiang and Zhao chau fu.

When anchoring off Zhao chau fu, it is advisable to moor head and stern in order not to obstruct the traffic, which is considerable. The holding ground is good.

Native coal can be obtained, but is of inferior quality.

About 3 miles above Huang kang the river becomes unnavigable, except for boats, on account of shallows, rocks, and rapids.

Nan ho.—For 12 miles above Zhao chau fu the river runs through reeds, after which there is flat country gradually becoming hilly. The bottom is generally muddy and the navigation easy.

In August, 1903, H. B. M. S. *Teal* reached the village of Shih chih liang, situated 6 miles above Lo ping; beyond this there are shallows. The current in the river did not exceed ½ knot. The river is said to be 10 feet higher in summer than in winter.

A branch, navigable only by junks, connects the Pei ho with the Nan ho at the village of Shih chih liang.

Lo ping is walled, has a few troops, and is within 10 miles of the nearest coal mines.

Ching tê chên (Kin taw chunn), situated on left bank of the Peh ho, about 60 miles above Zhao chau fu (Jao chao), is celebrated for its porcelain and earthenware industry, which employs many thousands of people.

The town, though well above the ordinary water level, is low relatively to the surrounding country, so that the violent freshets which frequently come down, both from the upper reaches of the main valley and from two more large tributaries which converge at this point, expose it to sudden and at times disastrous floods.

Ching tê chên is the second town in Kiangsi and is the residence of a subprefect. The population rises to about 400,000 during the busy season, which lasts for a short time in the summer, and is probably less than half that number at other times.

The China Inland mission and a Roman Catholic mission are established here.

Kan kiang approach.—Having rounded the headland of Chuki, the navigable channel takes a wide sweep to the westward into the extensive bay that receives the waters of Te an hsien. In clear weather a large round-topped hill is visible to the westward in this latitude at a good many miles distance; otherwise the country is so flat that no shore can be made out distinctly in this direction. This bay is said to be navigable as far as a sand bar that obstructs the mouth of the stream on which the city of Te an stands.

To the eastward are numerous sand islands, among which stand conspicuous Ta chi san and Hsiao chi san, the former being perhaps 500 or 600 feet in height, and a conspicuous landmark for many miles. The channels between these islands lead into the eastern basin of the lake.

Ringdove channel commences at about 2½ miles above Lao yeh miau and leads into the Kan kiang. This navigable channel is 120 to 300 yards in width, with a least depth of about 2½ fathoms when the water mark at Kiukiang shows 36 feet, but it should not be attempted without a pilot, although it has been marked by beacons as shown on the plan.

Wu ching stands on an island or peninsula, low, but well above flood level, with some small undulating hills behind. The Kan river washes its eastern shore and the mouth of the Siu or Ningchau river the western. A handsome pointed-roofed pavilion stands, with other buildings, on a small eminence at the confluence of the two waterways, and is visible for many miles. Both rivers are generally crowded with junks, and the town is a busy center of trade.

The Plymouth Brethren have a mission station at Wu ching.

Kan kiang.—From Wu ching to Nan chang by the Kan river is about 45 or 50 miles, according as the direct cut above the village of Wang chia tu is or is not available. For the first 13 or 14 miles the river, unless at low water, is little but a deep channel through fens and swamps, but from that point southward the shores become better defined and are often wooded.

To the east the country is an alluvial delta with no natural elevations whatever, though diked, cultivated, and in parts inhabited. The junk channels through the delta are numerous, and many of the areas inclosed by dikes contain sheets of open water that have rather the dimensions of lakes than of mere pools. To the west there is also much marshy delta country, but it is not continuous, being varied in places by ledges of low sandstone hills. Villages are rather numerous, and two, called Upper and Lower Siao chia tsang, respectively, are populous places.

Nan chang.—The city of Nan chang stands on the right bank of the Kan, which at this point is a very wide river, divided, however, into several channels by sand banks. Immediately north of the town is an undulating sandy region, but most of the site and surrounding country is scarcely above flood level.

The tall chimneys of the provincial mint, situated to the north of the town, are visible for several miles.

Nan chang is a walled city and the capital of the province of Kiangsi, and, from a Chinese standard, is a very fine town. Large shops are numerous in all chief streets.

Several missionary societies have establishments here.

About 25 steam launches, of which the largest is 82 tons, belonging to 8 Chinese companies, and 2 launches, belonging to British companies, ply between Kiukiang and the Kan river, coming up to Nan chang, when there is sufficient water, but at other times connecting with junks at Wu ching. The launches only carry passengers, but are largely used to tow cargo junks.

Tung se kiang, etc.—Two important junk channels connect with the Kan close to Nan chang. One of these is the Tung se kiang (East and West river), which was visited by H. B. M. S. *Teal* in 1903, and is named Dugmore reach and Higgs reach on the chart. It leaves the Kan a little below Nan chang and connects it with the bay or estuary at the southeast corner of Poyang lake, and is about 40 miles in length. The deepest sounding obtained from H. B. M. S. *Teal*, in August, 1903, with the Kiukiang water mark at 39 feet, was 7 fathoms and the least 1¼ fathoms.

The other channel is immediately above Nan chang, passing along the whole southern side of the town. This channel provides communication with the city of Fuchau fu, the distance being 60 miles. The provincial government has taken considerable pains to dredge and improve this waterway.

Feng cheng hsien, on the right bank of the river, 40 miles above Nan chang, has high walls, several striking temple buildings, good houses, and a busy landing place by the water side.

Shih cha, a town of some size, is situated on the right bank about midway between Nan chang and Feng cheng.

Between Nan chang and Feng cheng the right bank of the river is a dead level the whole way and for the most part protected by dikes. Toward Feng cheng, the riverside is faced for some miles by extensive stone embankments. The left bank of the river is generally higher, and in places diversified by undulating hills. At one point, called Lung tou shan, a few miles above Shih cha, a rather striking headland with red cliffs surmounted by a ruin comes down to the riverside, and opposite to it a ridge of very dangerous rocks, covered at high water, extends halfway across.

The mouth of the Juichou, or Shu river, is nearly opposite and a little below Shih cha. This river is 120 miles in length, but only appears to be navigable for native craft of light draft.

Chang shu, 60 miles above Nan chang, has a certain importance as a center of the drug trade.

The Meiling pass is only 1,000 feet above the plain, and connects the Kan with a branch of the North river of Canton at Nanhsiung chau; thus, except for about 30 miles of easy road, there is practicable water communication all the way from Nan chang to Canton.

Yüanchau river.—About 1 mile below Chang shu is the mouth of the Yüanchau river, which drains a country probably the richest in minerals in the whole of Kiangsi. Coal is extensively found in this river valley and beyond its headwater at Pinghsiang. Although the navigation is reported to be difficult and much obstructed by rapids, considerable light-draft junk traffic exists, sometimes as high as Yüanchau fu, and always up to Fên yi hsien. The city of Linkiang is situated on the Yüanchau river at about 6 or 7 miles from its junction with the Kan river.

Oliphant island, 10 miles in length, lying westward of point Becher, and Lay islands southward of it, here divides the river into three channels, all of which are shallow at some part of their course.

These channels are ascended on westerly courses, but North channel makes a broad bend to the northwestward at right angles to its direct course, at its junction with the water pouring out of the Poyang, which its swift current actually opposes. Eddies and whirls form from this cause at Becher, Oliphant, and Otter points, which make navigation somewhat intricate and difficult.

Direct channel.—From Becher point the direct channel is used, keeping on the northern side of Lay islands to about 1 mile from their western end, where there is a spar beacon, 45 feet above high river below Kiukiang; in winter sometimes only 6 feet of water is Here cross over to a similar beacon on Oliphant island at about 4½ miles from its upper end. This crossing is the shoalest part of the river below Kiukiang; in winter sometimes only 6 feet of water is found in it.

Beacon lights.—A white light over a red light is shown during high river from Oliphant island beacon and from Lay island beacon.

The beacons are moved as the channel changes, and when the water is low buoys are placed in addition.

At the western entrance of Direct channel Kiukiang rocks extend from under the red cliffs on the right bank and the bank dries 300 yards outside the rocks.

Kiukiang rocks light-boat, painted red and having one mast with a black ball, is moored abreast Kiukiang rocks during high river or from about May to January, and marks the starboard side of the channel for vessels ascending the river. The light-boat exhibits a fixed red light, visible 4 miles.

North channel is used for navigation in winter, or during low river.

Oliphant spit light-boat.—A native boat, having one mast and a ball, is moored at the end of the spit off the upper end of Oliphant island during low river, or from about November to July, and exhibits at 25 feet above water a fixed red light, visible 4 miles.

This boat marks the port side of North channel when ascending the river.

Caution.—The Oliphant channels are subject to continual changes. The latest information should be obtained from the river pilots, whose services are generally indispensable, and it may also be necessary to buoy the passages.

Kiukiang, a treaty port, stands on the right bank of the river, 12 miles above the outlet of the Poyang and 8 miles from its borders. It is 444 miles from Shanghai and 140 below Hankow. It was opened in 1861, having been selected on account of its proximity to the channels of inland navigation, especially those conducting to the green-tea districts of Kiangsi and Anhui, and has always been a port of some consequence.

Kiukiang is a prefectural city of Kiangsi province; its walls, 5 miles in circuit, are close to the river, and inclose the government offices and some temples. Its principal street runs east and west and also traverses the large suburb on its western side, above which the British concession extends about 500 yards, parallel to the river, as far as the Lung hai ho canal, which communicates with the lake fronting the city on that side. The British consulate occupies a central position on the bund.

There are comparatively few houses now inside the walls, most of the people living in a suburb immediately behind the British concession, where all business is transacted. The greater portion of the land inside the walls is cultivated. The population is estimated at 30,000 to 40,000.

The foreign community is small, and includes a British consul, a chaplain, a physician, and the employees of the Chinese maritime customs.

On the top of the mountains, at the back of Kiukiang and at an elevation of over 3,000 feet, there is a good health resort called Kuling, consisting of about 130 houses.

Accessibility.—Vessels drawing 27 feet can reach Kiukiang from June to October, but difficulty is experienced at times in winter with vessels drawing 11 feet.

Anchorage.—This part of the river is deep and rapid, and strong northeasterly winds cause much sea; the bottom is loose, coarse gravel, and very bad holding ground, and vessels not unfrequently drive with two anchors down. It is necessary to moor, as the anchorage space is limited, but the western limit of the anchorage for steamers has recently been extended from the mouth of Lung hai ho canal to a point about 400 yards higher up. For a short stay at single anchor take a position off the Chinese city, where there is not so much chow chow water as above it.

Four British steamship companies have wharfage accommodation in the form of hulks connected with the shore by pontoons. The German hulk is, and probably other hulks will be, moored off the river bank westward of Lung hai ho canal.

The inside or shore anchor of vessels mooring should be 300 feet from the hulks in order not to pick up their moorings.

Lung hai ho canal affords a refuge for native boats in storms in summer; during heavy rains the water rushing out of it forms a strong eddy. The anchorage off the canal is bad.

The outgoing stream is constant, as the flood never overcomes the ebb. Two wrecks lie off the settlement.

Supplies.—Meat, vegetables, and bread can be obtained.

Climate.—Although it is hot from July to September, and the temperature in August frequently rises to 100°, the heat is not damp and enervating. During winter continuous bracing cold weather is experienced, with snow and frost in January and February.

In 1900 the summer and autumn were unusually hot and dry; a temperature of over 100° in the shade was registered on about 20 days and 104° on 4 days in August. The lowest temperature was 24°, on January 9.

Trade.—The principal articles of export from Kiukiang are beans and peas, chinaware, grass cloth, hemp, liquid indigo, paper, sesamum seed, tea, tobacco, etc.; and of import, opium, cotton and woolen goods, metals, kerosene oil, sugar, native cotton yarn, cuttlefish, etc.

In 1905, the foreign imports amounted in value to $7,388,305, and the exports to $9,141,220.

In the same year, 1,936 steamers and 51 sailing vessels, with an aggregate tonnage of 2,704,921 tons, entered the port. The inland steam navigation amounted to 847 entries, with a tonnage of 62,971 tons.

Communication.—The steamers running on the Yangtze call regularly at Kiukiang. There is telegraphic communication with Canton via Nan chang and the Kan valley, also with Hankow and Shanghai. A telegraphic line connects Kiukiang with the hill sanatorium at Kuling.

River level.—The bund at Kiukiang is 41 feet 9 inches above the zero.

Seymour reach.—Immediately above Kiukiang there are extensive shoals off the left bank of Seymour reach, nearly as far as Hunter island. A long, narrow tongue, carrying 1 to 2 fathoms water, projects eastward from the left bank at about 7 miles above Kiukiang and narrows the passage opposite and above the customhouse, at 3½ miles above Kiukiang, to 400 yards. The course lies along the right bank to Tree point; thence it gradually closes the left bank and the southern point of Hunter island.

Court reach.—The river splits at Hunter island, 17 miles above Kiukiang, one branch making a sharp bend northeastward round the island, which is 3 miles in extent. The other branch passes through the straight channel southward of the island. A patch of 6 feet, hard bottom, is said to lie on the northern side of South channel eastern entrance. Shifting shoals extend for some miles westward of the island.

Hunter island.—In 1906, the southern channel had a least depth of 1¾ fathoms, reduced to the zero at Kiukiang.

This channel is only about 50 yards wide at its western end, between the right bank of the river and the bank extending westward from Hunter island.

Hunter island light-boat, painted red and having one mast surmounted by a ball, is moored off the western end of Hunter island during low river, or from about November to July, and exhibits a fixed white light, visible 7 miles. The boat marks the crossing at the upper end of Hunter island southern channel.

Red cliff bar is abreast some very conspicuous red cliffs on the right bank of the river.

In the channel south of Hunter island keep 200 to 400 yards off the right bank, increasing to 600 yards at the Red cliffs; pass close southward of the light-boat, whence continue at 200 to 400 yards from the right bank.

After passing Makau village, on the right bank at 6 miles above Hunter island, the right bank is kept aboard until abreast Li yu shan beacon, when the river is crossed for the village and creek opposite Futse kau. Wuhiutsun or Wusueh town, where there appears to be a flourishing trade in timber, lies on the left bank at 2 miles above Makau, and shoals extend off the left bank between this town and the village opposite Futse kau.

Li yu shan light beacon.—A small pillar in front of the keeper's quarters—a two-story gray brick building with a Chinese roof—on top of Li yu shan, a small hill on the right bank of the river about 4 miles above Wusueh and abreast the lower end of Hwang lin chau shallows, exhibits, at 84 feet above high river, a fixed white light, visible 7 miles.

Hwang lin chau shallows.—The bight of the river at Futse kau is for 3 miles filled with shallows, and the channel has narrowed considerably by the growth of the banks on both sides. A small river enters the Yangtze at Futse kau, and leads to a district of which coal and cotton are the two most important productions.

The left bank has most water after passing the village opposite Futse kau and for 3 miles beyond, after which a mid-channel course is kept until the creek southward of Havoc rocks is reached.

Kichau reach is entered at Pwan pien shan or Split hill, 3 miles above Futse kau. The river here becomes contracted, flowing through a hilly country, but the water is deep and the navigation easy except at the Havoc rocks and when approaching Kichau. In summer great attention must be paid to the helm between Futse kau and Havoc rocks, for the channel is narrow, with steep bluffs on both sides, and the current, which in places runs 5 to 7 knots an hour, being thrown off by the points, causes strong eddies. There is a point on the left bank at 2 miles above Pwan pien shan, on which is a joss house (ruin), and off this point are some rocks.

Low point light-beacon.—A pole surmounted by a ball on Low point, at 2½ miles northward of Pwan pien shan and on the right bank of the river, exhibits a fixed red light, visible 5 miles. The roof of the keeper's hut is painted red.

Havoc rocks are about 3 miles above Low point, and lie off the left bank in a bight between two low hills; the outer rock, 600 yards off the shore, dries 1 foot when the level of the water is at Hankau zero. A shoal, with less than 3 fathoms over it, extends 280 yards off the right bank abreast Havoc rocks, and caution is necessary in this vicinity.

Havoc rock light beacon.—On the right bank of the river, and on a blunt point at about 1 mile above the Havoc rocks, a pole surmounted by a ball exhibits, at 50 feet above high river, a fixed white light, visible 7 miles.

Ella rocks, which dry 18 feet, are rather more than 100 yards off the right bank at $1\frac{8}{10}$ miles above the outer Havoc rock.

Rocks also border the shore in front of a village on the right bank, at about 1 mile above Ella rocks, and a bank extends off the left bank from opposite Ella rocks to abreast the southern part of Kichau town.

From the point above the village just mentioned, and on which are two small hills, to above Kichau, or for about 4 miles, mud flats lie off the right bank, and the channel is dangerously narrow during winter.

Light-boat.—A light-boat, painted red, with 1 mast surmounted by a ball, moored about ½ mile below Ruined fort light, off the bank fronting the left shore of river. It exhibits a red fixed light, visible 7 miles. Vessels bound up the river should leave it on the starboard hand.

Ruined fort light beacon.—An artificial islet on which stands a remarkable ruined fort, lies in the river southward of Kichau town, and on it a pole, surmounted by a ball, at the corner of a hut, exhibits a fixed red light, visible 7 miles. The track passes within 100 yards westward of this rock; it then closes the left bank to about the same distance.

Ward reach trends north-northwestward and appears to be quite clear; the left bank is closed and kept throughout the reach, as extensive sand banks stretch off the northern part of the opposite side. At about 8½ miles above Kichau there are some rocks close off the left bank. Great caution is necessary in passing the bend at the northern end of the reach.

Ki tau (Cock's head), on the right bank at 16 miles above Kichau, is a remarkable bluff, rising perpendicularly to a height of 300 feet, and it is passed close-to.

There is a large cormorant rookery on this bluff.

Shi hui yau, a small village on the right bank at 3 miles above Ki tau, is connected by railway with Tieh shan or Iron hill, a distance of about 18 miles. This hill and others in its vicinity are composed of iron stone, yielding from 40 to 80 per cent of iron. There are also coal mines at about 4 miles from Shi hui yau and to the westward of Tieh shan; the present output is small; this coal is said to be good for steaming. The coal mines of the Wang san shi district are about 5 miles northwestward of Shi hui yau.

Lee rocks.—A bed of rocks, which dries at low water, lies abreast some limestone quarries at Shi hui-yau.

Buoys.—Seven (or more if necessary) black spar buoys mark the Lee rocks and others on the southern side of Shi hui yau reach during low river. These buoys are placed for the guidance of light-draft vessels using the wharf at Shi hui yau. The outer buoy, or the one nearest mid-channel, is lighted, weather permitting.

Vessels bound up or down the river give the outer buoys a wide berth and keep as close as practicable to the mud bank stretching off the left bank of the river. When past the Lee rocks keep the right bank aboard; the shoal off the opposite side renders care necessary while passing this bend.

Light.—A white lantern hut, situated on a bluff on the right bank at about 1 mile above Lee rocks, exhibits at 60 feet above high river a fixed red light, visible 4 miles.

Hwang shi kang, on the right bank at 3 miles above Lee rocks, is a densely populated little town, chiefly inhabited by quarrymen, with its river wall and balustrade of yellow sandstone, situated under the northern spur of a rugged limestone range.

Hwui lung ki rocks.—At the upper part of the bend above Lee rocks and on the left bank, 2½ miles above Hwang shi kang, and just below where the river splits round Collinson island, is a small rocky hill, 70 feet high, northward of which the Hwui lung ki, a ledge of rocks, extends nearly 200 yards into the river for more than 1 mile along the bank.

Collinson island lower light-boat.—A light-boat, painted red and having 1 mast surmounted by a ball, is moored, head and stern, off the lower end of Collinson island to mark Ayres channel, when water is at 30 feet above Hankow zero and rising; the boat exhibits a fixed red light, visible 7 miles.

Collinson island.—The river proper runs eastward of Collinson island, which is 5 miles in length; and this channel is used in winter. The track passes between Hwui lung ki rocks and the spit, extending from the southern point of Collinson island, above which it is along the left bank.

There is an extensive sand bank off the northern end of the island.

In March, 1906, the least water obtained on the bar at the upper end of the Winter channel was 6 feet, reduced to the zero at Hankow.

Ayres channel, westward of Collinson island, is a cut-off of 2½ miles. If proceeding by it hug the point opposite Hwui lung ki, and then pass through in mid-channel. At the northern end of the channel is a bar.

Collinson island upper light-boat.—A boat, painted red and having 1 mast surmounted by a ball, is moored at the upper end of Collinson island, near the left bank of the river, to mark the winter channel, from about December to July, and at the northern end of Ayres channel, to mark that cut-off from about July 1 to November 30. The light-boat exhibits a fixed white light, visible 7 miles.

If there be good water throughout Ayres channel keep moderately near the right bank round Yang ki point into Paho reach.

Paho reach.—A small stream enters the Yangtze at Paho, a small town built of red standstone on the left bank at the eastern end of Paho reach; the plain to the northward of the town, where there are some lakes, is inundated in summer.

After passing a small ridge of hills, on one of which is a remarkable and conspicuous boulder, continue along the right bank, passing the small village of Tsi ku kang, 3¾ miles above Yang ki. This reach is almost choked with shifting shoals, and in some years a bar of 10 feet forms just eastward of Tsi ku kang. These shoals are mostly middle grounds, their positions are uncertain, and the navigation of the reach is only safe with the most recent information.

Peh kwei or Ten-foot rock is nearly in mid-channel at about 1$\frac{3}{10}$ miles above Tsi ku kang; it dries about 25 feet in February, and is visible from the middle of November to the middle of April.

Light-boat.—A boat, painted red and having one mast surmounted by a ball, is moored near the left bank of the river opposite Ten-foot rock from about November 30 to June 30, and exhibits a fixed white light, visible 7 miles. The boat marks the starboard side of the channel when ascending the river.

Wuchang rock, off Wuchang town, which is on the right bank at 2½ miles above Tsi ku kang, is about one-third across the river and dries 17 feet, being above water from the end of November till the beginning of April. Vessels pass southward of the Ten-foot rock light-boat and northward of Wuchang rock.

Bythesea channel.—Hwang chau town is 3 miles northward of Wuchang on the left bank, and abreast it the river divides into two channels round Squeeze island. Bythesea channel, the western, has not been used since 1874; the eastern channel is clear.

Northward of these channels the river is clear for 4 miles up to Gravener island, but a spit projects 2 miles from the upper end of Squeeze island.

Light-boat.—A light-boat, with one mast surmounted by a ball, is moored on the spit at about 1$\frac{3}{10}$ miles northward of Squeeze island, while the river level is below 18 feet above Hankow zero; it shows a fixed red light.

Gravener island, round which the river turns by a sharp bend to the eastward, is cultivated and an embankment has been built round its northern part. There is a beacon on the southwestern point of the island.

The present navigable channel lies along the western coast of Gravener island, and between it and the banks extending northeastward from Willes island.

Light-beacon.—A white and a red light, placed horizontally, the white light being nearer the channel, are shown from the beacon on the southwestern point of the island.

Light-boat.—A boat, painted red and having one mast surmounted by a ball, is moored off the upper end of Gravener island, and exhibits a fixed red light, visible 7 miles.

Light-boat.—A light-boat has been moored about 2 miles to the westward of Gravener light-boat. It should be left on the starboard hand by vessels bound up the river.

Gravener island round channel has again opened (1906) and is available for vessels of heavy draft.

When entering from the southward steer in mid-channel, between the southwest point of Gravener island and the projecting point southward of it, thence follow the left bank of the river, which is steep-to, to avoid a shelving mud bank that extends from the Gravener island shore.

The channel between Willes and Gravener islands is silting up.

Willes island cut-off is the channel westward of Willes island; the rocks at the southern side of the entrance are usually marked by bamboos. This cut-off is used by steamers drawing 16 feet with Hankow watermark at 29 feet.

In December, 1903, with the Hankow watermark at 9 feet, vessels not exceeding 3 feet draft could use this channel.

Lo ko hi reach is foul, having several middle grounds and the right bank being rocky. The course during high river is from Pau hia ki cliffs crossing Hukwang flat to Porpoise bluff, 300 feet high, which is rounded in mid-channel, giving a berth to the Six Chickens and guarding against the eddies. Hukwang flat, 2 miles above Pau hia ki, has shoaled to 6 feet at low water Hankow.

Cores de Vries rock, with 4 feet over it, lies in mid-channel $1\frac{8}{10}$ miles 210° from a house on the left bank.

Hukwang rock, with 7 feet over it, lies about 1,000 yards 201° from Cores de Vries rock.

A ridge of rock extends 100 yards off the bluff abreast Cores de Vries rock.

Light-boat.—The buoys marking these rocks have been withdrawn and a boat with a ball at the masthead has been moored between them. It exhibits 2 fixed red lights, placed vertically, and should be left on the starboard hand by vessels bound up the river.

The boat is removed during the summer months.

Leading light beacons.—At Chung chih kuan, on the rocky right bank nearly abreast Cores de Vries rock, are a high pole surmounted by a black inverted triangular top mark, and a low pole nearer the channel surmounted by a white triangular top mark. Both poles are erected on pyramid-shaped stone beacons, which are covered when Hankow water gauge shows 19 feet 6 inches. The poles are placed in position in December and removed early in May, being maintained while the river is below 19 feet Hankow water gauge. A fixed red light is exhibited from the high pole and a fixed white light from the low pole.

The beacons in line lead nearly in mid-channel southward of Hukwang rock.

At So chia chih, on the right bank abreast Hukwang rock, are a low pole with a white diamond-shaped top near the river bank, and a high pole with a black diamond-shaped top farther inland. A fixed white light is exhibited from each pole.

The beacons in line lead nearly in mid-channel eastward of Cores de Vries rock.

The winter or low river channel is along the right bank eastward of Cores de Vries rock, southward of Hukwang rock, and northward and westward of the Six Chickens rocks. The sand bank off Bouncer island, which forms the left bank of the channel, extends considerably into it. Hukwang channel, northward of Bouncer island, is a cut-off 1½ miles, used by light-draft vessels, when the water is at 20 feet.

Six Chickens rocks extend about 200 yards off Porpoise bluff and dry when the water is 10 inches at Hankow. The channel here is only 200 yards across, with strong eddies and chowchow water, and great care is required.

A rocky bank extends 100 feet from the shore at 1 mile westward of Lo ko hi village.

Pi hu shan or White Tiger hill, about 400 feet high and 2½ miles westward of Porpoise bluff, is kept aboard.

Light-boat.—A boat, painted red and having one mast surmounted by a ball, is moored at the lower end of Bouncer island, on the northern side of the spit to mark Hukwang channel from about July 1 to November 30, and on the southern side of the spit, to mark the lower entrance to the round or winter channel, from December 1 to June 30. The boat exhibits a fixed red light, visible 7 miles.

Caution.—Even when the current above Kiukiang is weak, at the Six Chickens rocks its rate is 3 to 4 knots and caution is necessary to prevent being set on these rocks during winter·

Yang lo reach.—At about 1¼ miles above Pi hu shan is the commencement of a shoal off the right bank which extends northward to Low point, and from Pi hu shan the course is north-northwestward between this shoal and the bank extending westward of Bouncer island. A ruined temple stands on the left bank at 5¾ miles northward of Pi hu shan. The small town Yang lo, 1 mile above the ruin, may be approached closely.

Yang lo light beacon.—A pole supported by a tripod on the western extremity of the high land at Yang lo and 14 miles below Hankow exhibits a fixed white light, visible 7 miles.

Rocks, covered after April, lie off the point northward of Yang lo town.

Pakington reach.—Sha kau is a village under a flat-topped hill, and lying in the bight northward of Yang lo, which bight is rocky; and between Sha kau and the creek above it shoals extend about half a mile off the left bank. Above these shoals the left bank is kept well aboard through Pakington and Hankow reaches, as shoals extend off the right bank for several miles, which contract the channel.

At about $1\frac{3}{10}$ miles below Hankow city wall there are two beacons in position during low river, which in line bearing 4° lead across the shoals extending up the river to Hankow at about 200 yards from the left bank, in a depth of $4\frac{1}{2}$ feet at lowest river. The inshore track continues along the left bank till nearly abreast the middle of the German concession at Hankow, when a south course leads over the bank in about 10 feet at lowest river.

Light-boat.—A light-boat having one mast with a spherical cage as top mark is moored off the northern end of Hankow city wall, and exhibits two fixed white lights.

Hankow is a treaty port, 134 nautical miles above Kiukiang, 586 from Shanghai, and upwards of 600 from the sea; it is situated on the left bank and immediately below the mouth of the Han, which flows into the Yangtze from the northwestward. At Hankow the Yangtze is about 1 mile across, and immediately above the Han; the rives passes through a group of hills isolated on the vast plain through which it here flows. On these hills, on either bank, are the walled cities Hanyang and Wuchang fu.

The flagstaff of the British consulate at Hankow is approximately in Lat. 30° 34′ 30″ N., Long. 114° 20′ 35″ E.

Accessibility.—Vessels drawing 27 feet can reach Hankow with safety from June to October, but difficulty is experienced at times in winter with vessels drawing 9 feet.

Anchorage.—The usual place for ships to moor is from the lower end of the French concession to about 200 yards above the British consulate, at a distance from the left bank according to the height of the river and sufficient to allow the ship to swing clear in an easterly gale. Vessels must moor, and it is found advisable in mooring to lay the anchors out at an angle of about 45° to the direction of the stream, with from 45 to 60 fathoms of cable on the port or riding anchor, and 20 to 50 fathoms on the starboard anchor.

The pilots appear to prefer a dropping to a running moor, as they consider that the first anchor has a better chance of holding when dropped with stern way.

It is inconvenient during summer to lie far out in the stream, as the strong current makes communication difficult.

It is necessary to sight the anchors frequently, or they become embedded in the soft mud and can not be weighed, thus, with the river at or above 30 feet above zero, the anchors should be lifted every 4 days and immediately after every freshet; with the river between 30 feet and 10 fet above zero, every week; with the river below 10 feet above zero, as necessary, but generally once a month.

Vessels here are liable to the danger of being fouled by the timber rafts which sometimes during freshets break adrift from the banks higher up where they are moored. These rafts are of immense size, frequently covering an area of half an acre and drawing 15 feet water, so should one get athwart hawse, a vessel might be carried miles down the river before she could be got clear. Owing to orders issued by the Viceroy, these rafts are navigated with greater care and are better secured than formerly.

Rise and fall of the river.—At Hankow the river rises in summer 39 to 50 feet above its winter level.

Generally, when at its highest or lowest level, the river rises or falls a few inches only during several weeks, and then the rate of the rise or fall increases rapidly.

The banks begin to flood at 38 feet; at 40 feet most of the low land is covered; and at 45 feet the whole of the low land is flooded, in many places resembling a large lake, when navigation is very difficult, and good local knowledge is necessary.

The country surrounding Hankow is generally under water from July to September, leaving the three cities like islands, with water around; and in some years the water is so high as to cause the richer portion of the inhabitants of Hankow to remove to Wuchang Fu, and the poor to the neighboring hills, while those who remain have to inhabit the upper stories of the houses. The foreign settlement has also been under the water.

Rate of the current.—At Hankow the general rate of the current is 2½ to 3 knots and sometimes less, but during freshets it reaches 5½ knots. At the anchorage 100 yards off the bund it is, approximately, 3½ knots in July, 3½ to 4 knots in August, 2½ to 3 knots in October, 1½ to 2 knots in November, and ½ knot to 1½ knots in December and the early part of the year.

The rate of the current during freshets out of Han river is 5 to 8 knots.

Hankow City is the most celebrated of the native marts of China. It commands a most extensive network of river communication, which has given it prominent commercial importance from a very early period.

Hankow native city extends 1 mile along the left bank of the Yangtze and 2½ miles along the Han, but occupies no great depth inland. Two parallel streets, crossed by other curved streets leading to the water side, traverse its entire length. The custom-house is at the lower extremity of the city near a fort. A defense wall and creek inclose a rectangular space of about 4 square miles.

The British concession at the lower extremity of Hankow has a frontage of 800 yards, with a wide bund along the riverside accessible by five jetties, and the various mercantile houses whose steamers run between Hankow and Shanghai have established wharves for their accommodation. The consular buildings occupy the lower part of the British concession. Northward of the British concession are the other foreign concessions, so that there is now a continuous line of concessions for 4 to 5 miles along the river front, 2 miles of which is bunded. Indications of enterprise and prosperity are not lacking in any of the concessions, as houses, warehouses, and factories are springing up in numbers. The population of Hankow is estimated at 530,000.

Repairs.—There is no machinery for shipbuilding or engineering work at Hankow, but ordinary repairs can be effected.

Supplies.—Pork of a more or less questionable quality can always be bought either in the market or from the villagers, but there is a scarcity of other meat. The supply of mutton is very small, and that of beef but little in excess of the requirements of the inhabitants. Fowls and ducks, also eggs, are obtainable in almost unlimited quantities. Vegetables and fruit are cheap and plentiful. Water is dangerous to drink unless distilled or carefully boiled and filtered. Native wine, which resembles European spirits, is practically undrinkable. The universal beverage is unfired tea, and the boiling of the water and its mixture with the tea seems to destroy the disease germs in it; this pale native tea, almost boiling, is a most refreshing drink, even in the hottest weather, and it can be obtained in every village. Several of the large foreign general stores have branches at Hankow.

Coal.—A large quantity of Chinese and Japanese coal is usually kept in stock at Hankow; it is taken alongside steam vessels in boats and put on board in baskets. Messrs. Jardine, Matheson & Co. keep a limited quantity of Welsh coal.

Trade.—The principal articles of import to Hankow are cotton goods, opium, metals, analine dyes, machinery, kerosene oil, railway plant, seaweed, sugar, etc., and the principal exports are cotton yarn, beans, hemp, hides, medicine, musk, nutgalls, wood oil, opium, sesamum seeds, silk, tallow, tea, tobacco, wax, etc.

In 1905 the foreign imports amounted in value to $39,192,760, and the exports to $43,023,190.

In the same year 1,609 steamers and 1,294 sailing vessels, with an aggregate tonnage of 1,987,899 tons, entered the port. The inland steam navigation amounted to 1,383 entries with a tonnage of 32,935 tons.

Communication.—Eight lines of river steamers afford daily communication between Hankow and Shanghai. The vessels are from 500 to 1,900 tons. Steam vessels run regularly between Hankow and Ichang. These vessels reach 250 feet in length, 40 feet in width, and a draft of 5½ feet with the average cargo.

The railway from Hankow to Peking is now working. The total length is 750 miles, and the time taken on the journey is about 60 hours.

An express runs once a week each way, doing the journey in 36 hours.

Steamers run regularly to Chang sha, on the Siang river, during the summer.

The principal station or depot at the Hankow end is to be on the river front at 3 miles below the city, where a stone bund will be erected and rails carried along it for the convenience of steamers loading and discharging. Two other stations will be provided, chiefly for passengers, one behind the foreign concessions and the other at the Han river.

Telegraph lines.—The Imperial Chinese Telegraph Company now has lines connecting the chief places in the Empire with one another and the capital. Hankow, besides its connection with the treaty ports and Peking, is joined to Cheng fu, Yunnan fu, and Kweiyang via Chungking and Lu chau, and via Yunnan fu with the Burmese and Tonquin frontiers.

Sailors' home.—There is no sailors' home at Hankow, but there is a sailors' rest at the London Mission, and seamen are made very welcome. It has a reading room and a library, but no sleeping accommodation.

Quarantine.—In case a vessel has any infectious disease on board she is anchored below the city and is visited by the medical officer.

Hospitals.—There are two hospitals; one is maintained by the London Mission for missionaries and Chinese only, the other, maintained by the Roman Catholic mission, is for foreigners and Chinese; it has a special ward for seamen, and the charge is for officers 3 taels and for men 2½ taels a day.

Climate.—The climate is dry and the summer is hot. The hot weather lasts until the middle of September, whence to December highly enjoyable weather prevails, the thermometer gradually falling until, in January, it is below freezing point. Snow and ice occur during most winters, but are not of long continuance.

In January the prevailing winds are between northeast and southeast; northeasterly gales occur, accompanied with heavy sand storms, and sometimes last three days. Weather is fine and cold with occasional snow. Barometer, maximum, 30.70 inches; minimum, 30.01 inches. Thermometer, maximum, 58°; minimum, 17°.

In February northeasterly winds prevail with occasional strong gales from the same quarter, which sometimes back to the northwest and are accompanied with rain; there are also light winds from other quarters. The weather is generally dull and cloudy, with some rain and snow. Barometer, maximum, 30.52 inches; minimum, 30.19 inches. Thermometer, maximum, 59°; minimum, 30°.

In March northeasterly to northerly winds prevail which sometimes blow a gale; there are also light southerly winds and calms. The weather is generally squally and rainy. Barometer, maximum, 30.60 inches; minimum, 29.85 inches. Thermometer, maximum, 78°; minimum, 37°.

In April northeasterly to northwesterly winds prevail with some gales, in which the wind backs from northeast to northwest and blows hardest with fine weather, becoming overcast and rainy as the wind moderates; southeasterly to southwesterly winds and calms are frequent. Rain falls sometimes continuously for a week. Barometer, maximum, 30.34 inches; minimum, 29.73 inches. Thermometer, maximum, 88°; minimum, 45°.

In May the winds are variable, but those from north to south, through east, are common. The weather is generally cloudy and rainy. Barometer, maximum, 30.11 inches; minimum, 29.66 inches. Thermometer, maximum, 92°; minimum, 58°.

In June and July northeasterly winds prevail, sometimes with the strength of half a gale. There is much rain and the country round the concession is flooded. In June, barometer, maximum, 29.90 inches; minimum, 29.46 inches. Thermometer, maximum, 88°; minimum, 64°.

In July, barometer, maximum, 29.74 inches; minimum, 29.46 inches. Thermometer, maximum, 98°; minimum, 75°.

In early August the weather is wet and very unsettled. Barometer, maximum, 29.93 inches; minimum, 29.55 inches. Thermometer, maximum, 104°; minimum, 78°.

In September northeasterly and northerly winds prevail, usually accompanied by rain, with occasional calms and light airs from southeast to west. Thermometer, maximum, 87°; minimum, 70°.

In November northeasterly and northerly winds prevail with scarcely any rain. Northerly gales commence suddenly and last for three days, but the barometer gives good warning. Thermometer, maximum, 67°; minimum, 48°.

In December light northerly and northeasterly winds prevail, with occasionally northwesterly gales, accompanied with storms of dust from the neighboring plains. There is but little rain and slight frosts occur. Thermometer, maximum, 61°; minimum, 31°.

Diseases.—In winter and early spring smallpox is prevalent in the native city; men who have not been recently vaccinated should undergo that operation; the native city should not be entered during the epidemic. In summer and autumn bowel complaints are prevalent; diarrhea, occasionally assuming a form of summer cholera; acute dysentery; enteric and malarial fevers; but true Asiatic cholera is rare and then only occurs in imported cases. General hygienic regulation of the bowels is most important, and either the slightest form of diarrhea or of constipation should have immediate medical attention, as little warning is given, and measures are necessary at once. The sun should be avoided.

Hanyang lies on the left bank of the Yangtze above the Han river and in the angle made by the junction of the rivers. The city is conspicuously situated, its walls passing over the Ta pie, a barren ridge, whose summit, crowned by a pagoda, commands the three cities. The population is about 100,000.

There is a government arsenal, with iron works, etc., at Hanyang.

Wuchang fu, on the right bank opposite, is the capital of Hupeh, where the governor-general of Hupeh and Hunan provinces resides. It is a most important official center in the Yangtze valley and the western provinces. It is fortified and has a double-bastioned wall along the river; a ridge runs through the center of the city. In 1900 a concession was opened on the bank of the river, where foreigners and Chinese can build residences and business houses, and in that year a substantial embankment was completed from Wuchang city walls to the bluff, about 7 miles down the river, to protect the country from the annual inundations. The population of Wuchang fu is about 400,000.

DESCENT OF THE LOWER YANGTZE.

Hankow to Kiukiang.—The downward voyage from Hankow is at all times dangerous and difficult. In summer the great rate of the current renders skill and caution necessary, especially during the time of rapid subsidence. In summer also the banks for many miles are under water and the channel is only distinguishable by its turbid and turbulent appearance; when the greatest rate of the current has abated, the river has greatly fallen and newly formed shoals are encountered. The alterations which take place from year to year are so great that if a pilot can be procured the descent of the river should not be attempted without one.

When below Collinson island the principal difficulties are over and there are none of any consequence between it and Kiukiang, for although the banks are submerged in places they are distinguishable and avoided with caution. Also the light-boats and light beacons are effectual guides.

Kiukiang to Chinkiang.—Oliphant island presents the first difficulty after leaving Kiukiang, for at its lower end where the various channels meet, both banks are flooded; another difficulty is at the lower part of Christmas island, where the country, very flat and without trees or houses, is flooded. The lower points, as a rule, are all flooded; and in the bights, the flatter the bend the less is the overflow, and the sharper the bend the greater the overflow.

Chinkiang to the sea.—The highest rise in summer being 14 feet, the river banks are less submerged. Plover point is sometimes inundated, but as the channel is buoyed navigation is not affected.

The Han kiang.—The length of the Han kiang from Hankow to Han chung (the head of navigation) is 3,720 li; between are the following places with their distances from Hankow: Tsai tien, 60 li; Han chuan hsien, 180 li; Hsien tao chen, 360 li; Yo kau, 480 li; Sha yang, 662 li; An lu fu, 837 li; Liu shui kow, 917 li; Ye chien hsien, 1,000 li; Siang yang, 1,142 li; Hsing an fu, 2,480 li. The length of the li varies in different localities, but 3 li may be considered approximately equal to 1 mile. Han kiang is only 70 yards wide at its mouth, but it opens out a little distance in, and as far as Yo kau its breadth is from 200 to 500 yards. Above Yo kau the river is a good deal broader, reaching in places a width of ½ mile; but it is almost impossible to define the river banks, which are sometimes so low and slope so gradually that a small rise of the river would flood a large extent of country. In May large tracts of cultivated land appeared to be under water, and the height of the water then was about 12 feet lower than it often is in summer, so probably in summer the river is in places 2 to 3 miles wide as far as Siang yang. Between Siang yang and Han chung the river is generally much narrower, but at places it is fairly wide; at the rapids it is much contracted.

The river is liable to change its course in an extraordinarily short time; this and the heavy freshets in summer render it improbable that it will become a trade route of great importance.

The adjacent country as far up as An lu is very flat and well cultivated. There are many embankments, which in places form the river banks, on both sides. At An lu the country becomes more hilly.

The banks of the river between Hankow and Lao ho kau, a distance of 1,420 li, are generally low and flat; thence to Han chung they gradually become steeper, and in the upper reaches and in the gorges, the banks are quite precipitous. The bottom between Hankow and Lao ho kau is mud and sand, thence to Han chung, mud, sand, and rock.

The river channel for 4 miles above Hankow is in the middle, and has a depth of 4 to 7 fathoms; then there is a right-angled turn with a sand bank projecting from the right bank of the river, and for a considerable distance the channel gradually crosses from one bank to the other about every mile; the deep water is apparent.

About 12 miles above Hankow there is an awkward place at low river, the river taking a bend of some 160°, and a sand spit running a long way off the left bank.

Tsai tien, a town of small importance, is situated on the right bank at about 20 miles above Hankow.

Hsing kau, a town with about 5,000 inhabitants, is situated on the left bank at about 10 miles above Tsai tien.

Han chuan hsien, 12 miles farther up, is a walled city with a population of 5,000, situated a short distance inland from the left bank of the river.

The river above Han chuan becomes more difficult for navigation. At Chau tse lao, 7 miles above the city, 2 sand spits, 1 from each bank, run out and overlap each other; the channel between the sand spits has a very sharp turn and is narrow; it is advisable at low river to wait till this place is clear of junks before attempting the crossing.

Mei wang tsai, a town situated on both banks of the river, is about 24 miles above Chau tse lao; the channel here is very intricate and shoal, and there is strong chow-chow water.

Hsien tao chen, 13 miles farther up, is a large agricultural town, situated on both banks of the river; the local magistrate stated that its population was about 20,000.

Above Hsien tao chen navigation becomes much more difficult, and the river in many places is very shoal, especially at Ma yang tan, 11 miles farther up, and also at about 2 miles above the place, where a depth of 5 to 9 feet was obtained for a considerable distance.

Feng shi ho is about 5½ miles above Ma yang tan, and at about 5 5 miles farther up 2 sand spits run out and overlap each other, the channel between them being very narrow.

Yo kau, 13 miles above Feng shi ho and 120 miles above Hankow, is a large city on the left bank of the river, with a population of some 15,000; the inhabitants are chiefly agricultural. A great amount of bean cake is exported from this place, and a certain amount of silk is made.

The river above Yo kau begins to get much broader, and sand banks are more frequent in its middle; some of these are dry with the water at 8 feet at Hankow. Tsang chi kang is 12 miles above Yo kau, and about 2 miles farther up is a shoal with a depth of 3½ feet over it.

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Chang li an is about 13 miles above Tsang chi kang, and at ½ mile above Chang li an there are a great many sand banks all over the river. A pilot stated in 1902 that the river had of late years altered very much here.

Opposite Yeh chia tan, or at about 3½ miles above Chang li an, is a well-known shoal on which the least water obtained by the *Teal* wher passing over it was 6 feet, Hankow water mark being at 9 feet. Teng hsing kau is another well-known shoal on which the *Teal* obtained 5 feet.

Sha yang is situated on the right bank of the river at about 170 miles above Hankow; it has a population of about 15,000. There is a trade route between Sha yang and Shasze by which a great deal of salt, opium, and other goods are sent; it passes by canal from Sha yang into a lake called Chang hu or Ta pai hu, which is 10 miles long, and then by the Pien ho canal to Shasze. Sha yang is connected with Shasze by telegraph.

The river above Sha yang is full of sand banks, many of which are dry with the water at Hankow at 9 feet. Ma ling is a small town at the foot of the hills of that name, situated on the right bank of the river at 21 miles above Sha yang. A ledge of rocks runs out for some distance abreast of the town, and there is strong chow-chow water by the ledge. At 3 miles above Ma ling the river is shoal with a least depth of 5 feet, Hankow water mark being at 9 feet; and abreast of Shih pei there are depths of 4 to 6 feet. At Tang kang, 11 miles above Ma ling, the river takes a bend of some 150°; it is very broad at the bend, but the channel is narrowed by a sand bank running out from the left bank.

An lu fu is a walled city about 2 miles from the left bank of the river and 223 miles above Hankow. It is now declining, but was formerly of some importance. The city was once on the river bank, and the course of the river is still changing hereabouts. An lu was reached by H. B. M. S. *Teal*, drawing 3 feet, in April, 1902. The city is connected by telegraph.

Rapids.—The rapids of the Han, which are above Lao ho kau, like those of the Yangtze, are all affected by a change of the water level, some improving with a rise and some becoming worse.

These rapids exist just below Yung yang fu and the western entrance to the 60 li gorge, this gorge being about 30 miles eastward of Yang hsien.

The 60 li gorge is 20 miles long; it is a succession of rapids and contains the Pieh tan, which is considered one of the worst rapids on the Han. The Pieh tan is caused by central rocks round which there are two channels; that on the right bank is shallow and can only be used with a rising river; that on the left bank is tortuous and is used at low river. When using this channel the boats are always eased down by hawsers and shooting it in the usual way is not attempted.

The Ko tan, at the eastern entrance to the 60 li gorge, is considered a bad rapid.

The Tseo ma chuh tong, 100 li westward of Yung yang, caused by outlying rocks with an intricate channel, is a bad rapid.

The Chong peh teo, between Yung yang and Po ho, is a bad rapid caused by a central rock and a rocky jutting out point on the right bank. The deep channel is between the central rock and the right bank; the channel on the left bank is shallow.

The Hsien yu tan, between Yung yang and Po ho, is another bad rapid; the river here has a very sharp bend and the current sets strongly on to the right bank. The channel is close round the right bank; the left bank side is shallow.

The Tsy yang tan, situated at the town of this name, is considered bad; there is a sharp turn in the river and the water is shallow.

The Lan tan, situated on the border between Hupeh and Shensi, is a strong rapid, the strong water being on the left bank.

Native boats in descending the upper Han frequently tie up above the rapids and examine them before proceeding. Hawsers are often used to ease the boats down.

Freshets.—Strong freshets occur in summer, and floods are prevalent and cause much damage to the towns and villages. It is said that no town of importance can possibly spring up below Siang yang, as the risk from freshets is too great.

Navigation.—For navigation the river may be divided into two parts—the upper and lower Han.

The lower Han may be considered that part of the river between Hankow and Lao ho kau. It is free from rapids, and launches drawing 4 feet are said to reach Sha yang in summer and a place called Tse kou in winter. Native craft drawing 3½ feet reach Lao ho kau in summer; in winter they do not load so deeply and then frequently ground.

Steam vessels drawing 4 feet could usually ascend the river without much difficulty as far as Lao ho kau between May and September, inclusive, but there would be great risk in descending from Lao ho kau to An lu, as the channel winds between sand banks and the current is very strong, except with a very high river, when the vessel could probably pass over the sand banks. Steam vessels drawing 4 feet and with a length of 160 feet could usually navigate the river all the year as far up as Yo kau, but there would be some difficulty in going down; short steam vessels of the same draft could probably get to and from Sha yang at low river.

On the upper Han, between Lao ho kau and Han chung, the native craft are lighter and are built to pass the rapids, the cargo being transhipped at Lao ho kau, which is a distributing center of some size. Steam navigation above Lao ho kau appears to be impracticable.

In winter boats drawing 1 Chinese foot (14 inches), and in summer boats drawing 3 Chinese feet, reach Han chung.

The craft on the lower Han are propelled by oars, sailing when possible; those on the upper Han are tracked.

Pilots.—As there are no professional pilots for the Han kiang, it is well if ascending the river to obtain a junk captain, who has just come down and knows the river. These men appear to find the channel by the appearance of the water, and they state that, as the sand banks in the river are constantly changing, the channel is probably different each time they go up or down.

Journeys.—The upward journey from Hankow to Siang yang has been done in native boats in 12 days, but the average passage is 18 days. The downward journey takes 6 to 8 days.

The upward journey from Hankow to Han chung has been done in 9 weeks in native boats and has taken as much as 4 months; an average journey may be considered as 3 months.

The downward journey from Han chung to Hankow has been done in 18 days, but the average time taken is about 25 days.

Trade.—The principal exports are grain, sesamum, beans, tobacco, tumeric, herbs, hides, and medicines; the principal imports are native and foreign calico, foreign piece goods, sugar, crockery, cotton thread, and kerosene oil.

The country through which the Han kiang flows below Siang yang is a very rich grain-growing land, from which spring, summer, and autumn crops are obtained. Wheat and barley are the principal crops, and a very large amount of the surplus grain finds a market in Hankow.

Natives.—The disposition of the natives to the foreigner is generally good, and the farther one proceeds westward the better it becomes.

Supplies.—Small cattle, poultry, fish of poor quality, vegetables of all kinds, flour, rice, and fowl's eggs in small quantities, can be obtained anywhere on the river below An lu, and it is said that in the upper reaches good mutton can be procured.

MIDDLE YANGTZE.

Hankow to Yo chau.—The navigation of the Yangtze to Yo chau, at the entrance of Tung ting lake, 122 miles above Hankow, presents no greater difficulty than that below Hankow.

Money.—Hankow is the most western port at which the Mexican dollar is actually current, and even in its back country copper cash are preferred to either coined or uncoined silver. Farther westward, besides cash, sycee silver is necessary, as well as good paper, which consists of Chinese drafts on Chinese merchants of repute in the far west. Silver shoes, as the lumps of silver obtained from the bank are called, are worth about 50 taels, but the tael is of no fixed value, the haikwan or customs tael varying from the Shanghai tael, and that again from the Hankow tael. Also Hankow sycee is of 2½ per cent higher standard than Shanghai sycee, and Szechuen is of a higher standard than that of Hankow.

Pilots.—There are no licensed pilots for the middle and upper Yangtze; usually a number of junk pilots, who know the river well but are unused to handling steam vessels, can be obtained through the shipping hongs.

Caution.—At all times, and especially when at anchor or proceeding by night, beware of the numerous large rafts of timber floating downstream. The river is frequently crowded with junks and boats.

Above Wuchang fu the vast plain is entered, which from above the low range crossing the river and terminating in the flat-topped Ta kin shan or Great Golden hill on the left bank, about 14 miles above Hankow, is unbroken by a single eminence for some hundreds of miles. Below this range are Siau kin shan or Little Golden hill, and some low grassy hills on the river side 7 miles above the city; both banks are otherwise low, large tracts being partially flooded in the middle of March, and in June the whole country is under water.

There are shoals just above the creek at Wuchang fu, on the right bank a little below Kwan kau, off the left bank on the upper side of the creek at Kwan kau, and close to the right bank off the Red cliffs at Shi chui there is a ridge of rocks about 6 feet above water. At about ¾ mile above Shi chui is a rock, covered at low water and marked by a sampan until there is sufficient water for junks to pass over it. The bank shelves off Siau kin shan, where it is shoal for some distance. The large town King kau stands on the right bank, 1½ miles above Ta kin shan.

After passing the walls of Wuchang fu rather closely haul out to avoid the shoal off the creek and keep nearly in mid-channel, but rather closer the left bank than the right, until abreast of Ta kin shan, when keep the left bank until nearing the bluff at Kwa mau hien to clear the large sand bank off King kau, at the upper end of which are two rocks, the largest being about 12 feet above water.

King kau reach.—Above the bluff at Kwa mau hien are three rocks, one near the middle of the river and the others on either side.

When nearing the bluff haul out in mid-channel, keeping the leading beacons in line when passing the rocks at Kwa mau hein; then close the right bank to Mei tan chui.

Leading light beacons.—On the right bank of the river at 2 miles above King kau rocks are two beacons, a low pole with an inverted triangular top mark and a high pole with a triangular top mark, both painted black. These beacons in line lead in mid-channel between the rock in the middle of the river and the rocks lying abreast it on the right bank.

The rear and higher beacon exhibits a fixed red light, the front beacon a fixed white light.

Bank.—From about 1½ miles above Kwa mau hien to Mei tan chui the left bank is shoal.

Farmer bend.—The right bank of Farmer bend is shoal, and in its northern part is a shoal, which approaches the left bank but leaves a narrow channel with depths of 9 fathoms between. The left bank is kept aboard round this bend; the track then passes close eastward of Ashby island and round a shoal extending off the right bank of the river northeastward of the island. Then keep the right bank, but cross the river below Sang pai chu village and again at Custom-house creek; on nearing Hau chin kwang haul into mid-channel and then close the left bank.

Hope reach.—Hau chin kwang village stands on a point of the left bank at the southern entrance of the bend, 14 miles above Ashby island, and in turning out of the bend pass close to the point, and follow the left bank through Hope reach, which has several middle grounds, crossing over when approaching Ku chi village, situated at its upper end, 15 miles above Hau chin kwang, on some low, red earth cliffs, and keep this right bank for 10 miles or till past both the broad openings of a shalow roundabout channel on the left bank, off which are extensive sands.

Lu tsi kau village is above the first opening, and 1 mile above this is Shi ta kau, where there is a ruined temple, and good and cheap fish can be obtained. After passing the small hills 3½ miles above these villages, keep rather toward the left bank, where there is a brick kiln, above which, off the point and northward of a small range, is a bar. From Si dan kwan, below the bar, to Taukau creek, above it, there are several shoals, some of which are dry, with a channel between them and the right bank.

Sing ti reach.—Sing ti, 94 miles above Hankow and 5 miles above the bar, is the most important town on the river between Hankow and Yochau. The great number of junks and the large piles of timber here imply considerable mercantile prosperity; but at the end of June Sing ti is submerged with the whole country to the northward, excepting only the tops of some embankments, clumps of trees, and roofs of houses, while on the other side the flooded valleys of Kiun range and its extension look like arms of the sea.

A remarkable yellow bluff, on the right bank, 10 miles above Sing ti, has a rock off it, and at 4 miles farther up the upper part of Sing ti reach narrows to ½ mile between cliffs of red sandstone.

Yo chau reach.—Entering Yo chau reach, keep the cliffs on the right bank aboard to avoid Cha hau chi island, a large bank of mud, on the northern end of which there is a rock about 12 feet above water.

Mopan shih rock extends from 300 to 600 yards off the right bank; it has several heads which dry from 5 to 28 feet, and a bank, which dries, stretches about 800 yards northeastward of it. Rocks extend also nearly 200 yards from the right bank just above Mopan shih rock, and the channel along the right bank is narrow.

The left bank of the river between Chau hau chi island and Kin ho kau shoals off it for some distance. After passing Chau hau chi island, haul out from the right bank to avoid a shoal off it, closing the bank again when nearing Mopan shih rock; passing between it and the bank, haul out a little to avoid a reef off a village and 50-foot hill, on the right bank, and enter Huc reach on a mid-channel course or continue in the fairway to Yo chau fu.

The rock shown on the chart 2¼ miles above Mopan shih rock is a dangerous mass of rocks, which vessels have to keep nearly in mid-river to avoid.

The water off the left bank opposite these rocks is shoal.

TUNG TING LAKE AND TRIBUTARIES.

Tung ting junction.—At 116 miles above Hankow the waters of Tung ting lake flow into the Yangtze, the river itself winding westward. From the junction the branch stream runs southwestward 5 miles along the low spurs of the Kiun range, which is 2,000 to 3,000 feet in height, before entering the lake. The entrance is about 1 mile wide, and on its eastern side are red sandstone cliffs, with the conspicuous house of the commissioner of customs on the top; the western side is mud flats covered with reeds.

Chenglin, a treaty port opened in 1899, and the port of Yo chau, is situated on the right bank of the lake outlet near its junction with the Yangtze. There is fair anchorage off and a little above the custom-house, with a mud bottom, in 5 to 6 fathoms at low river. Below the custom-house the holding ground is bad, the bottom being pebbles. During strong northerly winds a nasty sea gets up and the current causes a light vessel to lie broadside on to it.

All the Hankow-Ichang steamers call at Chenglin, both on the upward and downward voyages, and three Chinese companies run large launches between Hankow and Chang sha, so that at any rate during summer there is almost daily communication.

There is a telegraph office in Chenglin where messages are accepted for any part of the world, and there is also a post-office under the direction of the imperial maritime customs.

No supplies beyond a few eggs and fowls can be obtained.

The situation of Chenglin is delightful, being on the high ground formed by the red standstone bluff, and is open to the breeze from all directions. It is said to be the coolest part on the Yangtze, and is fairly healthy; dysentery appears to be the prevailing disease.

At Chi li shan, 1¼ miles above Chenglin, is a seven-storied pagoda standing on a bluff.

Yo chau fu, 5½ miles southwestward of Chenglin and at the entrance to the lake proper, is a native walled city well situated on a bluff, its chief gate on the western wall being reached by a flight of massive steps from the water. The suburb lies along the water side southward of the city; in it is a tall pagoda, and there is a low one on the summit of a hill inland. Yo chau is a place of no importance, politically or commercially; its population does not exceed 18,000. A grass-grown island, 30 to 35 feet high, lies about 1½ miles westward of the large pagoda.

The anchorage at Yo chau is indifferent and a strong current sweeps along the bank in front of the city; in rough weather shelter has to be obtained by the cargo boats and lighters for conveying the merchandise to the shore either northward at Chenglin or in Lan tsing kang, a bay 3 miles to the southward.

There is a telegraph office at Yo chau, and messages can be transmitted to any part of the world.

Supplies of fish, fowls, duck eggs, etc., can be obtained in small quantities.

Trade.—In 1905 the number of vessels that entered the port was 1,122, with an aggregate tonnage of 513,160 tons.

Tung ting lake, 50 miles in length and about the same in breadth, is the largest in China. It receives the waters of three considerable rivers, the Siang, Su, and Yuen, which drain the province of Hunan and furnish an important affluent to the Yangtze. This lake is situated in the southwestern part of an extensive depression in Hupeh lying on both sides of the river, in which are many similar lakes connecting with it, the whole area being 200 miles long and 80 broad. The shores of the lake are generally low, but high in places, and the country inland is mountainous.

The lake during winter, or from November to April, and perhaps May, is little better than a large moras; the only water in it navigable for boats with a draft not exceeding 2½ feet, being the channel leading to the Siang river. During an average high-water season, or from June to September, and perhaps October, the eastern portion of the lake can be navigated by steam vessels drawing as much as 5 to 6 feet, but all the other part of the lake is unnavigable for vessels drawing over 2 feet, and even boats with that draft can not directly cross it. The rivers flowing into the lake are navigable by vessels of light draft, and Chang sha fu, on the Siang, about 92 miles from Yo chau, could probably be reached by vessels drawing 5 to 6 feet during high river, or from about June to October, but only by vessels drawing less than 3 feet from about November to May.

During the summer months the whole lake is flooded, not only by the waters of the Siang and Yuen rivers, but also by the Yangtze river, for which it is an overflow. Consequently, the depth of the water in the various rivers can not be estimated by the rise and fall indicated on the tide gauge at Chenglin, for it frequently occurs that although the gauge at Chenglin shows a fall, yet the water in the Yangtze is rising, and vice versa. This also applies to the Siang and Yuen rivers.

The lake is navigable at high water (viz, during the summer months), being flooded to such an extent that it is unnecessary in going from Yo chau to the Yuen river to follow the circuitous, tortuous, and narrow route via Lin tsu ko. H. G. M. S. *Vorwaerts*, drawing 6 feet, has frequently used the lake route and encountered no difficulties.

Although the Siang river passes through the lake, the channel being clearly defined during the winter months, it is impossible to keep in the channel at high water. Vessels then have no difficulty in going to Chang sha, the lake being flooded to a depth of 2½ to 3 fathoms.

Westward of the Siang river there is a strip of water about 3 miles broad with a mean depth of 3 fathoms, running north and south the whole length of the lake, and widening at the north end, where it deepens to 4 or 5 fathoms and forms a large bight.

Navigability.—In August, 1902, H. B. M. S. *Snipe* was able to reach Hung chau fu, 150 miles above Chang sha. In 1903 this was impossible, owing to the low state of the river.

Vessels drawing 8 feet can visit Chang sha from about June to October, inclusive, and vessels of greater draft for about two months of that period. But the time varies considerably, as the height of the water depends to a large extent on local rainfall.

Launches drawing from 3 to 5 feet continued to run throughout the winter of 1905–6.

The master of one of the steamers trading to Chang sha states that when the water mark at Chenglin is not below 25 feet the water in the lake may be expected to rise; when the level is below 25 feet the water in the lake will not rise again until the next high-water season.

Chang sha fu is about 114 miles from Chenglin.

Track.—To enter the lake steer southwestward from Yo chau and pass between Pien shan, a small wooded island, about 100 feet high, with a white house on its summit, and the bluff immediately above Yo chau. Then, during the high-water season the track trends into the bight between the bluff and Kiu ma tsui, a point distant 17 miles, in order to avoid some islands which are covered at this season. Kiu ma tsui is passed at the distance of half a mile, and thence the track is direct to Lei szh, passing inside some more covered islands. At Lei szh, at this season, the Siang river may be said to commence, and 400 yards off it is the bar of that river, on which a least depth of 9 feet was obtained when Chenglin watermark was at 33 feet.

The Siang channel leading to the Siang river passes along the eastern side of the lake and at low river it is practically bounded by dry land. There are shoals in the channel with a winter depth of about 5 to 6 feet over them. At the Siang river entrance is a bar, and, as the channel over it crosses the course of the river at an angle, navigation is difficult. It is quite impossible during the high-water season to define the Siang channel, as it is then covered by the water of the lake. The most difficult time for navigation is after the beginning of the rise and toward the end of the fall.

Siang river falls into the southeastern part of the lake, and its basin comprises the eastern two-thirds of Hunan province. The delta, merging into that of the Yuen, lies along the southern shore of the lake and consists of low, alluvial land.

Winds.—The prevailing and stronger winds during the greater part of the year are north-northeast, backing to the north-northwest as the Siang river is approached. During July and August the winds are usually from the southward with occasional heavy squalls, and from the north-northwest when there is any atmospheric disturbance in the Yangtze valley. The southerly squalls cause much damage to native craft, especially at Siang tan, as they blow obliquely across the river.

Changes of temperature are sudden in the Siang river.

Current.—The current in the Siang river, when freshets are strong, is about 3 knots. Generally the current runs with a velocity of from ½ to 1 knot per hour. Should the banks be covered to Po wei chi pagoda and the water at Chenglin be 20 feet or more, there is scarcely any current on the river.

In March, 1904, a strong current, estimated at from 6 to 7 knots, was experienced running through the deep-water channel of the lake to the westward of the high-water track.

Chang sha, the capital of Hunan and an important political and commercial center, with a population of probably over 300,000 inhabitants, is situated on the right bank of the river at some 92 miles above Yo chau; it is the place of residence of the governor of the province, the provincial treasurer, and the provincial judge, besides the other officials. Chang sha has a river frontage of 2½ miles, and is surrounded by a wall 9 miles in circuit. The streets, for a Chinese city, are broad and well kept, and there are some fine shops and business hongs. . There are also numerous temples and guild halls. The local industries are the manufacture of matches, bamboo fancy goods, and paper or cloth lacquered fancy ware; a good deal of work is done in brass and pewter.

The prevailing diseases are consumption, diarrhea, dysentery, and fever.

Chang sha was opened as a treaty port on 1st of July, 1904. Since that date there are great signs of advance, shops and hotels run on foreign lines having been established and an efficient police force organized. The proposed foreign settlement is outside the north wall of the city, and is about 1 mile in extent, north and south. There is a British consulate here.

The city proper has a river frontage of 1¼ miles and the walls are 5¼ miles in circuit. There are 7 gates, of which all, with the exception of the West gate, are closed at 7 p. m., or nightfall.

Outside the east wall of the city is a large foreign-built military college.

Among local industries is argentan or "white copper" ware. There are also two antimony refining establishments. A copper mint is being worked and a silver mint will shortly be established.

Several missionary societies have establishments at Chang sha.

Communication.—Messrs. Butterfield & Swire and Jardine, Matheson & Co. have each one steamer plying between Hankow and Chang sha, and to Siang tan when possible; the Japanese have two steamers belonging to the Hunan Steamship Company, and the Chinese have two large launches engaged in this trade. From Yo chau launches run to Siang tan. There is telegraph communication with Siang tan and Hung chau fu.

Trade.—In 1905 the imports amounted in value to $3,227,795, and the exports to $1,233,205.

In the same year 252 vessels, with an aggregate tonnage of 103,828 tons, entered the port.

Supplies.—Bread can also be obtained. The only coal suitable for steaming purposes is obtained from Ping hsiang. These mines are connected with Chu chau on the right bank of the river, about 18 miles above Siang tan, by a railway which will also be available shortly for passenger traffic. This railway starts from Ngan tuan, about 4 miles to the eastward of Ping hsiang, and is about 60 miles in length.

From Chu chau the coal is carried by the tugs and lighters of the Ping hsiang Mining Company to Hankow. Bars, 5 miles below Chu chau, and off Niu chau tan, 5 miles below Siang tan, interrupt this traffic in winter.

River level.—The zero at Chang sha is based on the lowest water observed in a period of 3 years.

In 1905, the river rose to a height of 40 feet, which is most abnormal, flooding Chang sha and the surrounding district; such a rise had not been known for 200 years.

The previous flood, which occurred in 1899, rose to a level of 37 feet.

Anchorage.—The best anchorage is just above the stone pier on the island, there being less current here and the rafts keep over to the other side.

Siang tan, also an important city, is situated about 27 miles above Chang sha in the middle of the tea districts, and its trade is considerably larger than that of the capital; it has a river frontage of 3 miles, and is surrounded by a wall said to be 9 miles in circuit. The whole of the river fronting the city is thick with junks. It is only at high river that it can be reached by vessels drawing 5 feet, and at low river navigation of the river above Chang sha is restricted to vessels of the lightest draft. The local industry is the spinning of white cotton. The river here is about 1,200 yards across.

Hung chau fu, about 105 miles above Siang tan, apart from its general trade, is important as a coal center.

Launches run between Hankow and Chang sha in summer almost daily. At high river season a vessel of about 2½ feet draft could proceed up the Siang, thence by canal to the Kwei ling ho at the Hunan border, and by that river to Wuchau, on the Si kiang. During winter the Siang is very shallow, and at its lowest level there is a depth of only 2 feet in places.

Li ling river (Lu kiang), which enters the Siang at about 23 miles above Siang tan, was ascended by H. B. M. S. *Snipe* for a distance of 12 miles in July, 1902; the river farther up is very shallow.

Yuen river falls into the western part of the lake, and its basin comprises the western third of Hunan province. The delta produces rice in large quantities, enormous rafts of timber come down from the mountain country, and the hills are rich in minerals, of which coal, antimony, and sulphur are now worked. The two cities to be considered in this region are Chang teh and Li chou, the latter, hardly inferior in size and commercial activity to Shasze, is situated on the border between the mountainous northwestern and the alluvial northern parts of the province. The Yuen is navigable to Tao yuen, 40 miles above Chang teh, at high river, but only by junks with a draft of 2 feet at low river. The character of the river changes at Tao yuen and it becomes narrow, with strong and dangerous rapids. There are 45 rapids between Tao yuen and Tsing ki, at 423 miles farther up the river, and the head of navigation for all but the smallest boats.

Yuen river—Routes.—There are two alternative routes from Chang teh to Yo chau, viz:

1. Down the Yuen river to Lung yang hien, and thence by cross-country creeks to Liu tsu ko on the Siang river, thence down the Siang river and the eastern side of Tung ting lake.

In 1904, on two occasions, with the watermark at Chang sha standing at 12 feet and 13½ feet, respectively, H. B. M. S. *Teal* proceeded from Liu tsu ko by cross-country creeks to the Yuen river. Although her length is 165 feet, no difficulty was experienced, and the speed of 8½ to 9¼ knots was not reduced except on one occasion, when the channel was blocked by a raft. The creeks are narrow in parts and some of the turns are very sharp, but the *Teal* did not touch either bank.

2. Down the Yuen river and across the southern part of Tung ting lake to Yo chau.

Autchi or O chih canal branches off from the Yangtze at Sunday island. At its entrance it has two main branches, one of which leads in a southerly direction to the southwest corner of the lake, and the other in a southwesterly direction to the Yuen river. The former is a broad stream, with no sharp turnings, and during the summer has an average depth of from 2 to 3 fathoms. Some miles up it bifurcates, and on reaching the lake both branches widen out and the channel is most difficult to find, owing to the numerous banks which are covered at high water.

The latter branch, called the Ngan siang canal, owing to its passing that district city, is as broad and even deeper than the one mentioned above, but between Ngan siang and the Yuen river there is in summer a waste of flooded country extending about 14 miles, where the difficulty is in tracing the channel. Should this difficulty be overcome, this would be by far the best commercial route between the Yangtze and Chang teh.

Chu tzu kau channel also branches off the Autchi canal and leads past the city of Nan chau ting to the eastward of those previously mentioned. It is broad, about 600 yards, but can not be recommended for steam traffic owing to numerous shoals. Nan chau ting is a large commercial center; large quantities of rice and smaller quantities of cotton, beans, etc., are exported. There is a Roman Catholic mission here, but no other foreigners.

Taiping canal leaves the right bank of the Yangtze about 15 miles above Shasze. During the summer months it is a broad stream with not less than 3 fathoms of water, and for a distance of 22 miles is in every way suited for navigation. Beyond this point, however, it can not be recommended, owing to its passing through flooded country and to the narrowness and winding course of the channel.

Hwa yung channel leaves the Yangtze at Tiau hien in the bight made at the junction of Collinson and Jamieson reaches. It is from 60 to 80 yards broad and runs direct to Hwa yung, a distance of 15 miles, with a least depth of 4 fathoms (August).

From here to the lake, which it enters in the northwest corner, it narrows and winds to such an extent that it is quite useless for navigation except by small junks.

The city of Hwa yung is a large and prosperous commercial city; the exports are the same as from Nan chau. There is a Roman Catholic mission here.

NOTE.—The lake entrances to both the Hwa yung and Chu tzu kau channels are exceedingly difficult to find at high water, being marked by a dense growth of weeds.

When the Yangtze runs to its summer level its waters overflow through all the above channels and flood the lake. On two occasions, once in the Taiping canal, and again in the Ngan siang canal, H. B. M. S. *Snipe* had the greatest difficulty in stemming the current, which was estimated at 8 knots.

Chang teh fu is situated on the left bank of the Yuen between two hills; its streets are rather narrow in places, but the river street outside the walls and the main street inside the walls have each a length of 3 to 4 miles, and on these streets are the chief yamens, banks, business hongs, etc., as well as some of the finest temples. The city wall appears to be well built; it is primarily for defense against invasion, but it also serves as a protection from inundation when the Yuen is in flood. The south gates are closed for several days almost every year, and in 1901 the water rose high enough to cover the gates and five out of the six gates had to be barricaded for about 10 days. The population of the city is about 200,000.

Chang teh has the reputation of being second only to Siang tang in commercial importance in Hunan province, and its situation makes it the receiving and distributing center for the whole of northern and western Hunan, as well as the provinces of Kueichau and Yunnan. There is a constant trade by junks between Hankow and Chang teh, and in 1901 a native company had 2 launches running at regular intervals during high river.

The products of Chang teh come from a rice-growing district; wheat is grown in moderate quantities on the higher land, and hemp and oil plants are cultivated on the dried rice fields. Cotton is grown in the district, and is exported up and down the river, besides being extensively manufactured into the coarse white cloth worn by the natives.

Supplies.—Good beef, pork (mutton at the new year), fowls, and ducks, the usual Chinese vegetables, a sweet potato (but not the foreign) can be obtained; fruit is scarce.

Trade.—The exports from Chang teh are varied, but the chief are rice, cotton, native cloth, hides, vegetable oils, timber, bamboo baskets, a small quantity of inferior silk, dried fish, beans, peas, and opium, which comes from Yunnan, Kueichau, and Szechuen.

The imports are salt, coal, kerosene (almost exclusively Russian), foreign dyes (German), foreign goods, such as calico, lamps, clocks, soap, glass, nails, and hardware; also galvanized iron for spouting.

Communication.—There is a telegraph station here.

The Su river flows northward and eastward through Hunan and falls into the southern part of the lake. Down this stream comes all the produce of the central part of the province and the productive district of Pao king fu, which is situated some 600 li up. The highest point that small steamers could reach is said to be the important town of Iyang hsien, which is the center of a large tea district and is a great coal depot. Little is yet known of this river.

Upper reaches of the Lower Yangtze comprise the section of the river extending from Tung ting junction to Ichang fu.

Certain features are common to the Yangtze in all parts of the plain of Hupeh. The color of the water is unmistakable. Even in winter it is far from clear, while in summer it is tinted with red, brown, yellow, and occasionally purple hues that denote an enormous bulk of earthy sediment. In fact, the ease and rapidity with which it alters its course or lays down and carries away immense beds of sand and mud forms one of the most striking natural phenomena of this part of the country. A comparison of the plan made from a survey in 1869 with the present course of the river shows that about 50 miles of the channel between Yo chau and Shasze have entirely altered in position within 30 years.

In consequence of the constant alteration in the depths and the shifting of the river bed the plan of the river from Tung ting to Ichang must not be relied on.

Ichang fu, 250 miles above Tung ting junction and 366 from Hankow, may be considered the highest point ordinarily reached by steam vessels. The easiest time to ascend is when the river is low, about the end of March, for when the river is in flood the channels in the lower part, or the first 200 miles, are difficult to trace. The towns of Shi shau and Shasze, the port of Kin chau, are respectively 121 and 170 miles above Tung ting junction.

There is little traffic on the river between Tung ting junction and Shasze. Junks use canals connecting Shasze with Han river and with Tung ting lake.

Tung ting junction to Shi shau.—The river now becomes very tortuous, but there is no difficulty in navigating it during the low level period as the deep-water channel is almost invariably close to the bank, which is steep-to, while shoal water exists a considerable distance off the shelving banks, particularly at the points. During summer, however, caution is necessary not to mistake the embankments for the true river banks, as the embankments sometimes lie considerably back. At the end of June the whole country southward of Nan tsuin hills is usually under water, so that the course of the river can only be known by the rate of the current.

Passing the sandy point of Kwei yin chau at the junction, Huc reach is entered. The steep banks are about 16 feet high, while opposite the shore slopes gradually down or runs out into long sand points and mud flats, the adjoining alluvial country being one dead level, with scattered hamlets and trees occurring at intervals. Sze pa kau village is in St. Patricks bend.

Camel reach is entered by a sharp curve and stretches northward 10 miles. Nan tsuin hills, 700 to 1,500 feet in height, lie westward of the middle of this reach, with the prominent Camel's hump, 900 feet high, at their eastern end.

Chai wan tung.—After passing Hia chai wan and Shang chai wan, the river rounds Brine bend, above which Hongkong reach is entered.

Bowlder shoal, in the lower part of Hongkong reach, lies nearly in mid-channel, and its position may be known by a peculiar bowlder on Ming hill, which is not seen in ascending the river until the shoal is approached. Ming hill is on the right bank of Hongkong reach, 5 miles northward of the Camel's hump.

Rounding Adams point, 67 miles above Tung ting junction, opposite which is Sin ho kau, the river turns abruptly northward through Bedwell reach, when Farmer point, an extensive sand point, being rounded, Collinson reach trends south-southwestward for 12 miles to Tiau hien.

Tiau hien is 87 miles above Tung ting junction, and a creek of considerable size flows through the town from the southward. The plain to the south is here 25 to 30 feet above the river, and is perhaps rarely flooded. Wheat is the staple production, but carrots, and especially beans, are largely cultivated. The western face of the Tung shan range, which rises 700 to 1,300 feet, is at the back of the town, and terminates northeastward in the Luh keo shan or Asses Ears peak, 700 feet high.

From Tiau hien the river again turns northward through Jamieson reach, and around Atalante bend, whence it winds through Michie and Salamis reaches to Shi shau reach.

A channel from Salamis reach to the upper part of Sunday island is used by river steamers.

Shi shau, 122 miles above Tung ting junction, is a small walled town of little importance, situated on the right bank at the upper end of Shi shau reach and at a very sudden bend of the river, on the slopes of a group of small hills, two of which are crowned with temples and all with trees, the highest rising about 400 feet and attracting attention from a long distance. Great quantities of osiers are grown on the marsh below Shi shau.

Sunday Island reach is usually the most difficult and changeable in the river, the crossing constantly altering so that steamers have to anchor and send out boats to find and mark the channel during the low-river season. The least water in 1904–5 was 6½ feet at lowest river.

Above Sunday island the river becomes comparatively direct, and its average width is ½ mile. Low islands occur, and in some reaches shoals are frequent, and the banks being, excepting at the bends, no longer a guide, caution is required.

Hohia, 144 miles above Tung ting junction, is a large village on the left bank at the northern end of Hohia reach and just below Compton reach. The river here narrows from 1,000 to 700 yards, and the current rushes against the left bank, which has been deeply cut into, and a wall of stone masonry protects the embankment. The country is richly cultivated with tobacco, cotton, rice, wheat, etc., and vegetables and fish are purchasable.

Embankment.—The great dyke, known as the Wan cheng ti, commences in a series of small embankments above Hankow, which are continued to Hohia, thence the dyke proper skirts the river past Shasze to its confluence with the Chu ho and follows the latter stream to Wan cheng, about 25 miles westward of Shasze. The dyke varies both in height and width in different parts, but may be taken to average 20 feet high on the river side, 40 feet or more on the land side, 25 feet at the top, and 150 feet at the bottom.

Sometimes there are several roadways at different levels on its sides. The strip of marsh land between the dyke and the river is in places a mere path, in others widening to a breadth of some miles, and in such cases it contains extensive lagoons and swamps, even at low river.

Compton reach, above Hohia reach, runs westward 8 miles; then Creasy reach continues north-northwestward 4½ miles, when the river splits round Tu ki chau, or Storm, island, and bending northeastward, passes Kwan yin shi village and enters Shasze reach. Swinhoe channel, westward of Tu ki chau, is deeper than Junk channel eastward of it.

Rock.—A rock, with 5 feet over it and 10 to 16 feet around, lies in Shasze reach, about 200 yards off Wagotze village, and nearly 3½ miles below Shasze town.

The river at Shasze flows between rather steep banks of soft, friable alluvium, mixed in places with sand and shingle. At the town it narrows to less than 1,200 yards, but both above and below the town it is much wider.

The country on the left bank is as flat as that on the right, and owing to several breaches in the dykes within the last few years, much more desolate. In fact, at most seasons, after crossing ½ mile or so of cultivated land, little but water is visible.

Rise of river.—In normal years the water of the Yangtze at Shasze is at its highest in July or August, when it is about awash with its banks. In September, 1896, it rose 3 feet higher, but such an occurrence had not been known for 27 years. The water falls to its lowest level in February, the difference between high and low levels being about 28 feet, which difference is much less than that at either Hankow or Ichang.

Depth of water.—The depth of water at Shasze is too variable for any determination to have permanent value; the same spot that has a depth of 16 feet 1 month may have 6 feet the next, and 36 feet a few months later.

Current.—In winter at Shasze the Yangtze runs with an easy current of 2 to 3 knots in mid stream and scarcely any current inshore. In summer it rushes down with a turbid flow of 7, 8, or more knots where it is deepest and 4 to 5 knots elsewhere. During temporary falls of the water level there is often a powerful backwater past Shasze and dangerous chow-chow water between the two currents.

Anchorage.—The anchorage is far from satisfactory; off the town there are bad cross currents and a shifting shingly or rocky bottom. Below the town a vessel anchoring near the shore is in danger of collision with junks or of being caught in a backwater.

In mid-stream the current is apt to be very violent, and communication with the shore is difficult, tedious, and not free from danger.

Steamers rarely anchor for over an hour or so, unless they arrive late and have to stay the night.

Passage.—The time occupied by steamers between Hankow and Shasze varies according to the condition of the river and the degree to which moonlight is available. At times, when the river is low, shifting banks may make it dangerous to proceed by night even at full moon, and at such periods or in the dark half of the moon, especially in winter, the trip to or from Hankow may occupy 4 or even 5 days. In summer, again, the outgoing current more than doubles the steaming time of upward-bound vessels.

Shasze, 170 miles above Tung ting junction, is the first place of any mercantile importance above the junction, and was opened as a treaty port in 1896. It is a place of no mean antiquity, containing a pagoda of the ninth century, and now its houses extend 3 or 4 miles along the river bank and for less than a mile inland. Kin chau city commences at about 2 miles from the northwestern end of Shasze, its southern wall lying parallel with the Yangtze at about 1½ miles from the river. It was the capital of Hukwang province until the division of that province into Hupeh and Hunan in the seventeenth century. Shasze and Kin chau contain together about 200,000 inhabitants. In summer junks line the river banks for over a mile both above and below the town.

Hankow is, in direct distance, about 135 miles eastward of Shasze, but, except in unusually dry seasons, there is no land route between these places. Shasze is regarded as one of the most important telegraph stations in the Empire.

Shasze, as seen from the river, has a very uninviting appearance, but it contains a very good and comparatively clean main street. A bund 400 yards long, built of hewn stone, with three large jetties for the use of hulks and two smaller jetties for native boats, has recently been completed.

About ½ mile from the river bank is the head of a canal, which is connected with the Han river and has a branch opening into the Yangtze at or near Keuen kau, 7 miles above Hankow. This canal is very extensively used.

The only consulate at Shasze is the Japanese.

At Shasze and Kin chau are district offices of the imperial post-office. There is a telegraph station at Shasze.

Trade.—The trade of Shasze is very insignificant as compared with that of the other treaty ports. Most of the trade is carried on in native craft by means of the inland water communication with Hankow and other trade centers, which render it independent of the Yangtze and of steam transport.

In 1905 the number of vessels that entered the port was 314, with an aggregate tonnage of 297,431 tons.

Canals, etc.—The whole peninsula between the Han and the Yangtze consists of a delta covered in all directions by a network of lakes and water courses, of which many are available for navigation either all the year round or during the summer rise of the rivers.

At Shasze there are 2 canals not connected with the Yangtze, but lying at a much lower level than that river. The larger and more frequented, known locally as the Pien ho, goes northward, throws off a branch to Kin chau, and then continues northeastward to a large lake called Chang hu or Ta pai hu.

Kin chau reach.—The shoals in this reach are very changeable. In March, 1904, the extensive sand flats shown on the charts off the right bank a short distance above Shasze, did not exist, and vessels then followed that bank except near the entrance to the Tai ping canal.

A temple and clump of trees on the eastern side of the entrance to Taiping canal are conspicuous.

About 10 miles above Shasze, on the right bank, is Tai ping kau, the mouth of Tai ping canal, which runs southward into Li shui river between Li chou and Anhsiang hien. At low river this canal is navigable only by small junks. A small village stands on the eastern side of the entrance. Smaller creeks, dry in the winter, from above and below Shasze join it.

A canal navigable for junks of all sizes and at all seasons connects the great lake near Huajung hsien with the Yangtze at Ouchih kou just above Shi shau. This is an important trade route for rice, timber, bamboos, and coal.

Shasze to Chikiang.—There are extensive sand flats off the point opposite Shasze, and a sand bank in the river just below Tai ping canal. Above Tai ping canal keep the right bank and close round the bend into Sandford reach. In this reach there are several sand banks.

Boone reach.—There is a junk channel to Kiang kau on the left bank, and 2 temples just below Tung tse, above which is Pa chau island. The bottom here is loose shingle and very bad holding ground; anchors drag with a light wind.

The navigable channel is on the northwestern side of Pa chau island; that on its southeastern side is closed at its northeastern end.

About 3 miles to the westward of Broad point, on the right bank of the river, is a large temple, which is a good mark for crossing over to the left bank when bound up the river.

The temple at Tung tse is conspicuous, being surmounted by a beacon or pole.

Spring reach.—The position of the sand bank marked on the plan below Grant point is doubtful; probably the crossing is above the sand bank.

At the upper end of Spring reach keep along the cliff around the bend westward, and pass southward of Hope island, which has a shoal off its western part; abreast the shoal and on the right bank is Yang chi village, where limestone is quarried and burnt and red bricks and tiles are made.

Chikiang hien, on the right bank at 3 miles northwestward of Yang chi, and 220 miles above Tung ting junction, is a walled city with an imposing river front. The mountain floods are felt here; one occurred in 1860, and did much damage to this town. From

Chikiang, Itu reach trends northward for 5 miles, when it curves westward to Itu city.

Pan yang village is 3½ miles above Chikiang, and about 1½ miles southwestward of the village is a high pagoda with a bush growing on its side.

Itu hsien is a walled city on the right bank of the river, at the junction of the Tsing kiang, a stream perhaps about 120 miles in length, flowing through a mountainous region; a trade in hides is springing up at Itu, and considerable quantities are now sent to Ichang for shipment by steamer.

The great southern highway from Szechuen reaches the Yangtze valley at Itu, after passing through Shihnan and other cities. It was, and is still to some extent, one of the chief trade routes of China, being that by which Szechuen opium was principally conveyed toward the eastern provinces in exchange for the cotton cloths and other produce of Hupeh.

A large shingle bank covered with mud lies in the river between Itu and Opossum point on the left bank; the Direct channel passes on the northern side of the shingle bank, and the Round channel on the southern side.

In the Round channel more rocks may exist than are at present known. At lowest river the water level at Itu has fallen to 5 feet below the zero at Ichang.

Northward of the shingle bank and extending about 1 mile above Opossum point is a flat, on which northwestward of the point are the Itu rocks, having 2 to 6 feet water over them. The channel over the flats westward of Opossum point is subject to change.

Itu.—There is a telegraph station here.

Itu rocks—Leading beacons.—There are 2 channels through the Itu rocks, situated from 1½ to 2 miles above Itu, called the Middle channel, and the Lower or Round channel, respectively. For these channels leading beacons have been erected on the right bank of the river nearly abreast of the rocks.

For the Lower or Round channel the beacon poles, which are painted black and surmounted by spherical shapes, lead 1 cable southwestward of the 6-foot rock. For the Middle channel the beacon poles are also black, but surmounted by triangular shapes; these lead about ½ cable from the rocks on either side of the channel.

Buoy.—A black triangular buoy, with a spherical cage topmark, is moored off the southwestern extreme of the Itu rocks when the river is below 8 feet, Ichang gauge.

Above these rocks Ichang reach trends northwestward for 16 miles to Ichang city. On either hand the banks become high and precipitous, bold cliffs of conglomerate and sandstone rising immediately from deep water. Westward and northward the country is mountainous, and it is, everywhere practicable, highly cultivated.

Above Itu rocks and the flat off Opossum point keep on the left bank of the river, and when well past the shoal point on the right bank northward of Opossum point cross over toward the first low hills on the right bank, but when past Hung hwa tau recross gradually to avoid the shoals off a mountain gorge 2 miles above that village. At 4 miles below Ichang and on the right bank there is a monastery on a commanding position 1 mile back from the river and 1,233 feet high; east-northeastward of the monastery is the lower end of Swain shoal, which is 2 miles in length, the channel being between the shoal and the left bank. This shoal varies in height and size, being 9 feet above water in April and sometimes in June; a 7-storied pagoda is on the left bank and ½ mile below its upper part.

The river below Ichang is nearly ½ mile wide, and the depth varies from 4 to 10 fathoms at low river, with a current which is variable, but seldom sluggish.

Above Itu the banks in the river are not so numerous as lower down, and are clay and gravel; rocks in places stand out from the shore.

Ichang fu, a treaty port, 250 miles above Tung ting junction, stands on a bluff point on the left bank of the Yangtze, a small branch of the river forming an island immediately above the walled part of the town. The water is shoal off the city, the deep channel of the river being along the right bank. The country around Ichang is mountainous and sparsely populated; there are no important waterways in its vicinity.

Ichang, in Lat. 30° 42′ 20″ N., Long. 111° 19′ 00″ E., is by the river 366 miles above Hankow, or 950 miles from Shanghai. It is a place of considerable importance as a repacking and transshipping station of goods; the imports for the provinces of western China, principally for Szechuen, are here transferred from the steamers into the native junks which ply between Ichang and Chungking under certain foreign customs rules; similarly the bulk of the exports from the west is brought down by junks running under the same rules. The population is about 100,000, with 70 foreigners. An immense number of junks is moored along the shore.

There are some thousands of native craft employed in the trade between Ichang and Chungking, these vessels draw about 5 feet.

Accessibility.—Vessels of less than 14 feet draft can reach Ichang in summer, and of 6 feet draft in winter. The difference between summer and winter levels varies from about 39 to 53 feet, but the bed of the river changes and silts up so much that there is scarcely more than 14 feet in many places at any time.

One of the four steamers running between Hankow and Ichang is 250 feet long, 40 feet beam, and draws, with an average cargo, 5½ feet; she has 3 screws, and does not require much space to turn in; she can accommodate 300 passengers, not including those in the steerage. The river steamers are provided with a steam launch, which goes ahead and takes soundings where necessary. For the present Ichang must be considered as the head of ordinary steam navigation on the Yangtze.

Anchorage.—There is good anchorage at and near the city.

Rise and fall.—For seven out of the nine years 1892–1900, inclusive, the lowest water at Ichang has occurred in February, and in the remaining two years in January and March. The lowest water-mark during this period was 11 inches below zero in February, 1897.

The highest water at Ichang during the same period has occurred four times in July, three in August, and twice in September. The highest water mark during this period was 53 feet 3 inches above zero on September 4, 1896. Thus the range of the water during this period amounted to 54 feet 2 inches.

Table of highest and lowest water marks at Ichang.

Date.	Highest.			Date.	Lowest.		
	Ft.	*in.*			*Ft.*	*in.*	
July 15, 1892	49	2	Above zero.	Jan. 31, 1892	0	0	Zero.
July 15, 1893	45	8	Do.	Feb. 12, 1893	1	1	Above zero.
Sept. 25, 1894	40	2	Do.	Feb. 25, 1894	0	7	Do.
Aug. 1, 1895	44	8	Do.	Feb. 27, 1895	0	7	Do.
Sept. 4, 1896	53	3	Do.	Feb. 6, 1896	1	2	Do.
July 13, 1897	44	2	Do.	Feb. 21, 1897	0	11	Below zero.
Aug. 9, 1898	47	11	Do.	Mar. 15, 1898	0	4	Above zero
Sept. 25, 1899	40	9	Do.	Feb. 6, 1899	1	3	Do.
July 21, 1900	31	9	Do.	Feb. 14, 1900	1	3	Do.

The greatest rise of the river at Ichang during 24 hours in the 8 years, 1892–1899, was 9 feet 3 inches on April 7, 1895; and the greatest fall during 24 hours in the 9 years, 1892–1900, was 4 feet 11 inches on May 8, 1897.

The rise and fall in the river varies with the locality.

Ichang, river zero.—The coping of the bund at Ichang is 47 feet 3 inches above the zero of the river gauge. A mark cut in a slab of stone in the middle of the custom's compound is 53 feet 3 inches above the same zero.

Trade.—Ichang is the port of transshipment for the river-borne trade between western China, the coast, and foreign countries. Above Ichang the junk, with an average carrying capacity of 45 tons, is still the only means of transport. In 1905 the net value of the trade of the port amounted to $2,454,550.

In the same year 157 steamers, of 147,928 tons, and 2,546 junks, of 82,136 tons, entered the port.

The principal articles of import to Ichang were cotton and woolen goods, aniline dyes, ginseng, kerosene oil, ribbons, and lead; and of export and reexport, bristles, hides, medicines, musk, opium, rhubarb, silk, white wax, and sheep's wool.

Supplies.—Meat, bread, and vegetables can be obtained. Water must be taken from the river. An uncertain quantity of coal is usually in stock.

Communication.—The passage from Hankow to Ichang by steamer, under normal conditions, is made in 3 days. Two Japanese steamers maintain a regular service, with a departure every 5 days from Hankow and Ichang. The steamers of two British and a Chinese company call at irregular intervals. From Ichang to Chungking the junks take from 30 to 35 days, with about 1 in every 10 wrecked.

There is an imperial post-office and a telegraph station at Ichang. A mail leaves for Chungking every second day and takes about 11 days on the way; to Cheng tu, the capital of Szechuen, the time is 14½ days.

Coal.—About 1,000 tons of coal are annually in stock.

THE UPPER YANGTZE.

Ichang fu to Chungking.—The distance by river from Ichang to Chungking in 400 miles. In this part of the river the breadth varies considerably, its greatest breadth being about 670 yards abreast Kwei chau fu and its least breadth being 175 yards across the Niu ko tan.

In April, 1905, H. B. M. S. *Widgeon* reached Chungking from Ichang in under 6 days, the actual steaming time being 47h. 50m. Average speed, 8$\frac{3}{10}$ knots per hour. Greatest distance run in one day, 122 miles. The rapids were passed without difficulty under her own steam and without the aid of hawsers to the shore.

The greatest depth obtained in April, 1900, was 60 fathoms at the eastern entrance to Ichang gorge and 60 fathoms in Wu shan gorge; the least depth in the channel at lowest river appears to be 9 feet at Lo tsi cheng, about 30 miles below Chungking.

The bottom is generally rock; in the gorges usually fine sand; in some places pebbles.

The bed of the river is exceedingly uneven, being apparently formed of rocky ridges and valleys.

The banks of the river are generally rock; in some places large bowlders and sand, and above Wan hien are some shingle banks. The rock is chiefly limestone, sandstone, and conglomerate; the strata are usually nearly at right angles to, or parallel with, the course of the river.

The course of the river is generally tortuous, but the bends are usually easy curves. At the following places, however, the turns are sharp and the river narrow: At the eastern entrance to Ichang gorge; 7¾ miles above that entrance; Ta mo tan, Wu shan gorge; western entrance to Fung seang gorge.

There are a few straight reaches. The principal gorges occur between Ichang and Kwei chau fu, and here are the most dangerous rapids, but rapids and eddies continue as far as and even above Chungking.

Lifeboats.—There is an excellent service of lifeboats maintained by public subscription; but, notwithstanding, the annual loss of life and the amount of cargo lost or damaged is very great.

Ichang gorge.—For 3 miles above Ichang the river remains of the same character as it has for some distance below, except that the right bank is high and rocky and its width is still about ½ mile across; it then suddenly turns westward and enters a deep cleft in the mountains, not 250 yards wide, with broken sides rising almost vertically 700 to 1,800 feet. At 4½ miles from the lower end of the gorge is the Sleeping Pig, a rock above water at low river. From the Sleeping Pig the river turns northward for about 2¼ miles, when it bends west-northwestward. This gorge is about 9 miles in length and deep.

A winding reach, called by the native boatmen Ya tse ho (Wild Duck river), some 15 miles in length, connects the Ichang and Niukan gorges. At about 3 miles above Ichang gorge, at a bend of the river, is the Hwang ling miao rapid, caused by some rocks in the middle of the stream and large bowlders on the shores; it is not of much consequence. About 2 miles above the Hwang ling miao is the Wui tan, or First rapid, and at 3 miles farther up is the small Shan tan pien rapid; there is not much difficulty in passing these rapids. In this reach the river widens out and is of a granitic formation, which it has disintegrated and broken up into piles of gigantic bowlders, such as none but Yangtze trackers would attempt to pass over. In a twist of the river at some 32 miles above Ichang is the Ta tung tan.

Ta tung tan.—This rapid is the first important rapid above that city. It appears to be partly due to the sudden shallowing of the river and partly to the obstruction caused by large masses of rocks and bowlders lying nearly in the middle of the river. These outlying rocks extend nearly parallel to the right bank for about 400 yards. The principal mass is 100 yards long, 40 yards broad, and is 15 to 20 feet above water, when Ichang watermark is at 6 feet 3 inches. The other groups of rocks are much smaller, and are 2 to 20 feet above water, with Ichang watermark as above.

The breadth of the river at the upper end of the rapid is 370 yards, across the large rocks it is 350 yards, and at the tail end it narrows to 270 yards. There are two distinct channels at this rapid, between the right and left banks and the rocks in the middle of the river, respectively.

The main channel, or that between the left bank and the rocks, is 230 yards broad at its narrowest part, and is always used by descending junks, and it should always be used both by upward and downward bound steam vessels. The narrow channel, which varies in width from 85 to 167 yards, is always used by ascending junks on account of the facilities for tracking.

On no account should a steam vessel use the narrow channel at low river, as the current is stronger in it, and the width of the channel allows no room to sheer.

Niukan gorge.—At 3 miles above the Ta tung tan, a precipitous range 3,000 feet high crosses the Yangtze, the river flowing through it for 2 miles by the imposing Niukan gorge, the sides of which rise vertically to a height of 1,000 to 2,000 feet. A little below this gorge is the Kung ling tan, which is formed by a rock in midstream about 30 feet above low river and a bowlder bank projecting from the left bank. The main channel is on the left bank side of the 30-foot rock. At low water this is the only channel, and it is then dangerous owing to rocks in it. At about 3½ miles above the Kung ling tan (Tung ling) and at the lower end of Mitan gorge are Shin tan village and rapid.

Shin tan.—This rapid is 44 miles from Ichang, and is the second important rapid on the Upper Yangtze above Ichang. It is divided into two parts—the upper and lower Shin tan. The lower Shin tan is due to a jutting-out bowlder on the right bank, which suddenly decreases the width of the river; off the bowlder point are a cluster of outlying rocks, the outermost of which is 24 yards distant from this point. These rocks were 3 to 4 feet above water in January, 1900, when the watermark at Ichang was at 2 feet 5 inches. There is a passage, 10 yards wide, between these rocks and the point, which is used by small ascending junks at dead low river.

Between this point and the upper Shin tan the river widens to 300 yards. The upper Shin tan appears to be formed by the widening and shoaling of the river. Several rocks seem to exist across the upper Shin tan, though in January, 1900, only one was above water; this showed 2 feet, but from the appearance of the broken water there are two others not far below the surface. The rock seen was 193 yards from the right bank, and between the rock and that bank broken water was seen at a distance of about 80 yards, probably caused by other rocks not far below the surface. There is apparently a rock about 60 yards from the left bank, in line with the positions of the other two.

The Shin tan is at its worst at dead low river, improving quickly with a rise. In January, 1900, the current was estimated at its strongest place to be 12 knots an hour, while in April, with a rise of 5 feet 6 inches at Ichang, it was estimated at 9 to 10 knots.

The best track for upward-bound steam vessels is along the left bank till abreast the lower end of Shin tan village, then crossing and along the right bank till above the rapid. This track avoids the strongest water and eddies and leads clear of all known dangers. Junks track up the right or the left bank according to the height of the water.

The current suddenly decreases to about 1½ knots at 200 yards above the line of rocks, which leads one to attribute the formation of the upper rapid to the sudden widening and shallowing of the river after its exit from Mitan gorge, which is narrow and very deep.

The banks are chiefly composed of large bowlders and rock at a general slope of 45 degrees.

Note.—Fifty feet rise at the Shin tan means a rise of 25 feet above low-water mark at Ichang, the water being dammed up above the narrows of Mitan gorge.

Mitan gorge hems in the river for a couple of miles above the Shin tan. Immediately above Mitan gorge the valley, though still bounded by precipitous mountains, opens out, but the channel is narrow, with a strong current of 6 to 9 knots in April, and at 4 miles from the gorge is Kwei cho, where there are some reefs, and the Lien hoa tan (rapid), which is not a difficult one to pass.

Kwei cho (Lao kwei chau) is a picturesque walled city situated on a bluff about 200 feet above low river, and near the mouth of a small affluent. There is mountainous country at the back of the city. From a distance the city appears well built, but it has no trade.

The river above Kwei cho has some swirls which become very strong above Koen tse kio as the river rises, owing to rocky ledges stretching across.

Ye tan.—This rapid, 4½ miles wide above Kwei cho, is the third important rapid above Ichang and is 56½ miles above that city. It is due to the sudden narrowing of the river, caused by a large bowlder bank on its left bank and a rocky projection on the opposite side. The breadth above is 340 yards, narrowing to 191 yards at its strongest part, and widening again to 469 yards immediately below it.

There are no obstructions in the main current. The current was estimated at 12 knots an hour in April, 1900 (watermark at Ichang, 6 feet 9 inches). No vessel with a speed of less than 13 knots can steam up this rapid, unless the shingle bank, at the lower end of the rapid and lying northeastward of a rock showing 25 feet when the watermark at Ichang is at 10 feet, is at least partly visible. Upward-bound junks are tracked up the left bank, hugging the bowlder bank; small junks occasionally use the right bank, and frequently come to grief in so doing.

A channel, 27 feet wide, is being cut through the rocky projection on the right bank, evidently for the use of ascending junks. The best track for ascending steam vessels is from the right bank gradually across the river, then along the bowlder bank until nearly in the narrowest part of the rapid, when turn nearly over to the rocky projection and thence into the river fairway; by following this track the greatest strength of the current is avoided both in approaching and crossing the rapid. Great care is necessary with the helm, in order to prevent bad steering. On all occasions of altering course, the helm should be given by degrees and the ship edged round gradually. There is a distinct inclined plane of water at the top of this rapid, which presents the greatest obstacle to ascending steamers. The *Woodlark* hung at this point with her bow just above the inclined plane and her stern halfway down it; by suddenly running all hands forward her stern was lifted slightly and she at once commenced to forge ahead.

Caution.—Below the rapid and close to the rocky projection on the right bank are swirls and small whirlpools, which are very dangerous to sampans and small craft, many being sucked under by them. These swirls continue for 2 miles below the rapid and are caused by the meeting of the upward and downward currents.

NOTE.—The Ye tan is at its best at dead low river, and its worst at high river. It is stated that at a very high river this rapid improves.

The river from the Ye tan to the Niu ko tan, about 8 miles farther up, is fairly easy, with some small rapids.

Niu ko tan.—The Niu ko tan is situated 64 miles above Ichang and is the fourth important rapid above that city; it appears to be formed by the sudden narrowing of the river, caused by a large bowlder and rock bank on the left bank of the river. The breadth at its narrowest part on April 19, 1909, was 180 yards, widening to 435 yards below the rapid and to about 400 yards above it. There is one obstruction in this rapid, consisting of a group of rocks lying 180 yards above its narrowest part; these rocks are nearly in mid stream. The height of the two of these rocks, which show at low river, was estimated to be 8 feet and 2 feet on January 26, the watermark at Ichang being 2 feet 4 inches.

There are two channels past these rocks; that on the left bank is always used by ascending junks on account of the facilities for tracking; the channel on the right hand is used by descending junks and is the best for steamers. The current on April 26, with Ichang watermark 7 feet 7 inches, was estimated to be running 12 knots an hour.

It is impossible to lay down any fixed track, but ascending steamers should enter the tongue directly end on; on each side of this tongue there are strong eddies and back currents.

This rapid is best at dead low river, and after a rise of 30 feet is considered worse than the Ye tan. At very high river Chinese pilots state that junks can not negotiate it on account of the tremendous swirls and eddies.

Patong hien, about 5 miles above the Niu ko tan, is a walled town, where there is a small coal trade.

Tsing chu piao rapid is a short distance above Patong; it is a bad rapid to approach at low river, the current not running fairly and there being bad swirls.

Wu shan gorge.—At 6 miles above Patong hien the Wu shan gorge leads between high precipitous mountains on either hand for 23 miles to Wu shan hien. The gorge varies in width from 350 to 600 yards.

The river from the Niu ko tan to Wu shan hien is fairly good. There are several small rapids in it when low. Wu shan gorge is difficult in places owing to rather abrupt turns and to freshets causing swirls. The average rate of the current at the upper end of the gorge was estimated to be about 6 knots in April.

Boundary.—The boundary between Szechuen and Hupeh provinces is at Pei shi village, in Wu shan gorge and in Lat. 31° 02′ N., Long. 110° 10′ E., approximately.

Wu shan hien, about 44 miles above Kwei cho, is the first city on the river in the province of Szechuen. It is situated on a slope facing the gorge and its walls extend half way up the mountain behind it. A small tributary enters the Yangtze here from the north and there is a small rapid at its mouth at low river. The city appears to have no trade.

The river from Wu shan hien to Fung seang gorge is comparatively open and consists of a succession of small rapids at low river. Of these the Hea ma tan is the worst. This part of the river improves with a rise.

Fung seang (Bellow's gorge), about 14 miles above Wu shan hien and the last of the four great gorges, is 6 miles long and averages 300 yards in width, but it is narrowed in three places by projecting rocky spits. There is a very remarkable cleft in the mountains forming the right bank of the river, below its lower entrance. The sides of the gorge appear to rise vertically to a height of about 1,500 feet. Above this gorge on the left bank of the river is the city of Kwei chau fu, but below the city there are a number of sand banks.

Fung seang gorge is a bad place at high river. At its upper end and off the left bank is Yeng yu rock, which is about 60 feet high at low river and awash at high river. When it is awash the current sets strongly on to it and junks are not then allowed to leave Kwei chau fu.

Kwei chau fu (Kwei fu) is a large city with very fine walls and gate towers, but it is said to be falling into decay. The surrounding country is well cultivated, but the city derives its importance from its salt works.

Anchorage at Kwei chau fu is good, but care must be taken to anchor abreast certain marks, so as to avoid jutting out bowlder banks.

The river from Kwei chau fu to Yun yang hien, a distance of about 25 miles, is bad at low river, when there are several strong as well as numerous small rapids. All are said to improve with a rise, but the Miao ki tse is spoken of as being always strong.

Yun yang hien is situated on the bank of a fine gorge, and it extends far up the slope of the mountain on which it stands. It has little or no trade, and there is no good anchoring or securing place. Above Yun yang the country opens out and is verdant and fertile, with grain crops, sugar cane, and rape.

Hsin lung tan (New rapid).—This rapid is situated about 7 or 8 miles above Yun yang and 178 miles above Ichang; it was formed by a land slip on the left bank in December, 1896. The soundings in the rapid proper are shallow, whilst above and below the soundings are deep. The breadth at the lower part of the rapid was, in May, 1900, 242 yards, midway up the rapid 260 yards, and immediately above it 350 yards.

At low water the outlying rocks in this rapid are dangerous to navigation, some of the rocks being just awash, the remainder showing above water. A rock covered about 2 feet lies 30 feet off the left bank; a rock with less than 6 feet over it lies nearly in the middle of the river, between which and the right bank, but nearer the right bank, are several groups of rocks 2 to 5 feet above water; these depths and heights were taken in February, 1900, Ichang watermark being at 1 foot 6 inches (low river). The rate of current at its strongest point was estimated at 13 to 14 knots in February, and at 9 to 10 knots in May. During low river there is a strong back current, estimated at about 5 knots, running close to the left bank and just below the upper part of the strong main current. At low water the majority of ascending junks track up close along the left bank; owing to the strength of the back current the junks are turned head down river and eased up it; they are then turned head up river and are tracked up close along the bowlder bank, passing inside the rock, 30 feet off it. At this time junks use four bamboo hawsers ahead and four bamboo hawsers as breasts to prevent the risk of sheering on to the rock. A few of the smaller junks use the narrow channel which exists between the right bank and the outlying rocks.

On May 1 all the rocks were well covered and a light-draft steamer could have passed over any of them in safety.

The Hsin lung tan is undoubtedly the worst rapid in the river at low water; it improves with a rise and at high water hardly exists.

The river.—About 2 miles above the Hsin lung tan is Pan to, a large bay in the right bank, which is a good anchorage and securing place. From Pan to to Wan hien, a distance of about 20 miles, the channel is clear of obstructions, except at Ta chou ki chang, where rocks extend a considerable distance off the right bank. Just below Ta chou ki chang there is a long stretch of small gorge only about 100 yards wide, with steep sides about 35 feet above low-river level, and above Ta chou ki chang the river is wide to Wan hien, with shingle banks extending alternately off each bank.

Wan hien is situated on a sharp bend of the river, built on cliffs and in clusters around temple and pagoda crowned hills, and surrounded by precipitous truncated peaks of sandstone 700 to 1,500 feet in height. It has fine streets and handsome shops.

To be clear of junks, it is best to anchor off the right bank of the river, above or below the rapid which exists at low river abreast the town.

Wan hien has a considerable import of foreign goods and a large native trade; about 1,000 hand looms exist in the city for weaving Indian hemp. There is an overland route from the city to Cheng tu, the capital of Szechuen, which is used for passengers and light goods. Coal is found in many places in the vicinity.

Wan hien will shortly be opened as a treaty port. There is an imperial post-office here and a telegraph station. There are also telegraph stations at Hwang ling miao, Kwei patung, Wu shan, Kwei chau fu, and Yung yang hien.

The river.—From Wan hien to Shi hui hia, a distance of about 24 miles, the banks of the river are either wide ledges stretching out from the base of the hills, with steep sides above low-river level, or shingle banks, projecting off each bank alternately. The Hu tan, about 8 miles above Wan hien, is said to be a dangerous rapid at high river. From Shi hui hia to Huang hoa cheng, an island about 800 feet in height and about 11 miles farther up, the river is intricate in places, a narrow channel winding through flat ledges of rock, which extend at low river nearly ½ mile from the foot of the hills. This continues to Tu tse pa, 2 miles farther up, where the channel widens, but is of the same character. The ledges are about 15 feet above low-river level in many places, so cover at high river.

Chung chau, 4½ miles above Tu tse pa, is a small city on the left bank of the river, with several well-built pagodas and temples. The country around is well wooded.

Anchorage is obtainable on the left bank side abreast the city. Below the city a rapid or race exists at low river. There appears to be but little trade.

The river.—From Chung chau to Lan chu pa, a distance of about 16 miles, outlying rocks are frequent and shingle banks are heaped up on these rocks, forming long, shallow, low-river races. The shingle banks are gradual and cover with a small rise. Thence the navigation of the river becomes more easy, until 3 miles from Fung tu, when it again becomes difficult up to that place.

Fung tu hien is on the left bank of the river; its trade consists mostly of opium, which grows largely in this vicinity. There is no good anchorage here; the best securing places are at 4 miles above the town at low river.

The river for 3 miles above Fung tu is difficult to navigate owing to scattered reefs and rocks, after which it becomes wide and clear to Nan to chang, 13 miles farther up, though there are said to be bad places hereabouts at high river. From Nan to chang to Huang ko tsuei, about 5 miles, there are ledges off both banks, whence to Fu chau, 8 miles farther, the river runs through a species of gorge.

Fu chau is an important town, built on ledges of rock, tier above tier, at the head of a reach so inclosed as to look like a lake. It has a large junk trade.

There is no very good anchorage at Fu chau, though there is a securing place on the right-bank side; a strong whirlpool is said to form abreast the town at high river.

Kien kiang, or Kung tan ho (the river of Kung rapid), flows into the Yangtze at Fu chau. This river is said to be navigable for 100 miles, but its mouth is blocked by reefs, and farther up there is a very bad rapid, the Kung tan, necessitating a peculiar-shaped boat for passing it.

The river from Fu chau to Nui shi tsi, a distance of about 12 miles, is wide, thence to Sheng tuo, 8 miles, navigation is intricate; outlying ridges of rock are frequent. There is a narrow place at Ta tu tsi at low river. Between Sheng tuo and Chang sho hien, about 6 miles farther up, large flat shingle banks project from both sides of the river and form races at low river.

Chang sho hien is a small town of no importance. There are no good anchorages near the town, but some good securing places at about 3 miles below it.

The river.—Above Chang sho at low river there is a narrow place past Wang kia tan; the river is divided into two channels here by a shingle bank which covers with a small rise; both are bad on account of the risk of collision with downward-bound junks. From Wang kia tan river is less intricate up to Mu tung se, a distance of about 18 miles, but thence to Lo tsi se, 10 miles, navigation is difficult, the current being strong off the rocky points, especially at Ma tsio tui and at Yei luo tse. Yang tsan tui is probably a nasty place at high river on account of high rocks nearly in mid-channel. The gorge between Lo tsi se and Tang kia to, about 2 miles in length, is easy at low river, but bad at high river. From Tang kia to to Chungking, a distance of about 7 miles, the river is wide, except near Chungking, where it narrows abreast Kiang pei ting; the current around the shingle banks is strong in places.

Chungking, a treaty port, and a city of 400,000 to 500,000 inhabitants, the commercial capital of western China was opened to foreign trade in 1891; it is situated 1,366 miles from the sea, where the Kialing kiang, a tributary from Pao ning and Shun king, falls into the Yangtze. The level of the river at Chungking is 620 feet above the sea.

Anchorage.—There are great difficulties in the way of anchorage at Chungking. It is believed that a gunboat in summer would have to shift berth to various places in the harbor, according to the state of the river; while the large rise and fall, sometimes 20 feet in 12 hours, would necessitate a constant lookout being kept in order to move the ship and hawsers in time, as she would have to be secured to the shore.

During the month of August, 1905, there was an extraordinary rise of the Upper Yangtze, which at Chungking rose to 108 feet. The rise was so rapid that whole villages were swept away and several thousands of people are said to have lost their lives.

When the Kialing is in flood it sometimes rushes out with such force as to dam up the main river, which makes the low-river anchorage below the mouth of the small river impossible on account of the strong upcurrent then running.

It seems probable that the quietest place to lie at, in high river, is Tang kia to, a bay 7 miles below Chungking on the left bank of the river.

Owing to the high temperature on the river in summer, due to the high banks and the heat reflected from the rocks, it would be advisable when the ship is secured to the banks to make the best arrangements possible for the men to live on shore for a couple of days at a time; if practicable, up in the hills 1,500 feet above river, where foreign residents go for a change, or by renting a house on shore.

There is at Chungking no single regular junk anchorage, many shallow bays on both sides of the Yangtze being utilized at different stages of the river. Junks lie in groups, some on one bank some on the other of both the rivers that unite at Chungking, and much time is lost and risk run in conveying goods to and from the anchorage, the city, and the customs examination station on the opposite bank. There is no bund.

Table of highest and lowest water marks at Chungking.

Date.	Highest.			Date.	Lowest.		
	Ft.	*in.*			*Ft.*	*in.*	
July 13, 1892	96	8	Above zero.	Mar. 19, 1892	0	0	Zero.
Aug. 12, 1893	67	0	Do.	Mar. 10, 1893	1	2	Above zero.
July 7, 1894	51	6	Do.	Feb. 24, 1894	1	2	Do.
July 29, 1895	81	6	Do.	Mar. 16, 1895	0	1	Do.
Sept. 14, 1896	67	3	Do.	Feb. 4, 1896	0	10	Do.
July 22, 1897	76	6	Do.	Feb. 18, 1897	0	7	Do.
Aug. 6, 1898	100	0	Do.	Mar. 19, 1898	0	4	Do.
July 4, 1899	70	3	Do.	Feb. 3, 1899	1	5	Do.
July 25, 1900	50	3	Do.	Mar. 7, 1900	1	1	Do.

Chungking, river zero.—The zero of the river gauge at Chungking is 105 feet 3 inches below the coping of the wall supporting the small wooden pagoda at Se tse shan (the customs quarters) on which wall the upper portion of the gage is painted.

Supplies.—Good beef, mutton, fruit, and vegetables are abundant.

Trade.—The principal imports are cotton goods and yarn, woolen goods, cuttle fish, metals, beche de mer, buttons, cardamoms, dyes, ginseng, needles, kerosene oil, seaweed, and general goods; and the exports, bristles, hides, medicines, musk, nutgalls, opium, rhubarb, silk, white wax, and sheep's wool.

In 1902 the value of the imports passing through the imperial maritime customs was $10,427,435, and of the exports $5,615,350, but this is only a fraction, probably one-fifth of the total trade of the port.

Chungking has telegraphic communication, and a branch of the new imperial post-office with a courier service from Ichang under the control of the foreign customs was opened at this port in 1897.

Coal.—From 150 to 200 tons of coal are kept in stock by the Chungking Trading Company.

Trade.—In 1905, the number of junks entered was 1,530, with an aggregate tonnage of 46,499 tons.

Communications.—From Chungking to Ichang, the mails are forwarded in small open boats, which make one passage only, as they are too frail to return up the river; on other routes they are carried by fast couriers. The maximum load for a courier is 50 catties (66 pounds), and with this he travels on an average 50 miles a day.

Hospitals.—One hospital under the English mission and one under the American mission are especially kept up for the Chinese, but rooms are set apart for Europeans. The principal diseases are diphtheria, phthisis, and remittent fever in the spring months. It is said to be a very bad place for people liable to phthisis.

Rapids.—Taking all the year round, there are 35 rapids between Ichang and Chungking in which the current at some period exceeds 6 knots an hour, and in all of them, at their worst period, caution must be observed. They are all affected by a rise or fall of the water, some improving and others becoming stronger. For instance, at low river the Shin tan and Hsin lung tan are undoubtedly the strongest rapids in the river, but at high river they almost disappear. On the other hand, the Hu tan, Koan in tan, Fu mien tan, Hiang lu tan, and Cha hu tsi hardly exist at low river, but at high river they are very strong and dangerous rapids. There are, however, two exceptions—the Lien hoa tan, which remains about the same all the year round, and the Kung ling tan, which is dangerous at low river to steam vessels, not on account of the strength of its current, but from the presence of rocks in its channel. Out of these 35 rapids there are 9 which a vessel with a speed of 13 knots can not steam at their worst period.

It is probable that all rapids are formed by one, or a combination, of the three following causes: The narrowing of the channel, the shallowing of the channel, center obstructions. It is very doubtful if a sharp incline in the river bed forms a rapid; if this was the case it seems likely that the rapids would exist at all times. Take an instance; the Hu tan practically does not exist at low river; at high river it is a fast and dangerous rapid. The banks on either side are sheer and lofty rocks. At low river there is room enough for the volume of water to pass through; as the river rises the volume of water greatly increases, but it has to pass through the same space with increased depth, the banks, being perpendicular, allowing no room for the river to spread itself.

The Shin tan is the reverse of this; here at low water the channel is comparatively narrow, but as the banks slope well back on either side the rising water has room to spread and consequently the rate of the current diminishes. At the worst rapids the belt of strongest current, which is always at their heads and often only a few yards wide, is quite apparent to the eye, the water running down in an inclined plane. It is this belt of strongest current that causes difficulty to an ascending ship, as here not only has she to force her way against the current but also to raise herself up the plane.

This inclined plane has not the same declivity across a rapid; it is usually greatest near the middle of the channel and least close to the banks. The effect of this inclined plane was strikingly shown at the Ye tan, when ascended by the *Woodlark;* the bow of the ship was just over the crest of the plane, and almost out of the water, whilst her stern was buried nearly to the level of the deck; by running all the crew forward the bow was depressed and the stern raised, after which the ship forged ahead.

It may be advisable to use a hawser as a general rule in the rapids as then the chances of sheering are minimized, and wear and tear of main engines may be saved a little. At low river it would probably be necessary, to insure safety, for even the fastest steamers to use hawsers at the Shin tan and the Hsin lung tan, in order to prevent the possibility of sheering, as at these rapids, owing to dangerous outlying rocks, the channels are much contracted.

Current.—The main current in the Yangtze above Ichang is at all times rapid, but its rate increases with the rise of the river. In April, 1900, the current between Ichang and Chungking averaged about 4 to 5 knots an hour. There are places where the current is comparatively slack, notably in the gorges at low river, and in some reaches above Kwei chau fu.

Back currents.—Back or up currents exist generally where the main current is most swift, and especially at the rapids. The rate of the back currents in the Ye tan when it is running strong is 4 to 5 knots an hour, and the rate of the back current in the Hsin lung tan is 5 to 6 knots an hour at low river, when this rapid is running strongest.

Swirls and whirlpools.—Strong swirls exist in many parts of the river and become worse with a rising river. The worst swirls are usually found at the foot of the rapids in the gorges at high river abreast Kwei cho in the reach above Ichang gorge, and in some other parts of the river, depending on the height of the water. Whirlpools exist in similar places to the swirls and are dangerous to small craft, such as sampans and small wu pans.

There is said to be a very bad whirlpool at Pu tai ku, in the Wu shan gorge.

Freshets.—Freshets occur in summer, usually in June, July, and August. When a freshet occurs the river rises rapidly, and the rate of the current is temporarily much increased.

Towns.—The following are the principal towns between Ichang and Chungking: Kwei cho (Lao kwei chau), on the left bank at 52 miles above Ichang; Pa tong hein, on the right bank at 70 miles above Ichang; Wu shan hien, on the left bank at 107 miles above Ichang; Kwei chau fu, on the left bank at 130 miles above Ichang; Yun yang hien, on the left bank at 169 miles above Ichang; Wan hien, on the left bank at 205 miles above Ichang (the above towns are connected by telegraph); Chung chau, on left bank at 256 miles above Ichang; Fung tu hien, on the left bank at 291 miles above Ichang; Fu chau, on the right bank at 324 miles above Ichang; and Chang sho hien, on the left bank 355 miles above Ichang. With the exception of Pa tong hien these are walled towns; the first two are in Hupeh, the others in Szechuen.

Supplies.—Small quantities of poultry, vegetables, fruit, rice, eggs, and fish; also sometimes beef and mutton (goat) may be obtained at the principal towns.

Water taken from the middle of the river, after being well boiled and filtered, may be used with safety for drinking.

Natives residing in the country along the river bank are quiet, well-disposed people.

In the large towns the inhabitants are not so well disposed toward the foreigner, and it is unwise to wander far from one's boat, unless in parties or under Chinese escort.

Climate.—During winter the climate of Szechuen, generally, is considered very depressing, on account of the absence of sunshine and the misty state of the atmosphere. Between Ichang and Chungking, during 41 days in January and February, the sun was only visible on three occasions, though at night it sometimes cleared and the stars were seen.

In summer the sun shines brilliantly and the weather is oppressively hot. At Chungking for 15 days in May the maximum daily temperatures were between 94° and 72°, and the minimum between 62° and 74°, in the shade. In June and July the temperature at Chungking often reaches 100° and over; it is said to reach 110°.

Szechuen is remarkable for absence of wind.

From Ichang to Kwei chau fu during part of the day there is usually some wind, locally known as the Shang feng, up-river, or the Hsia feng, down-river wind, but above Kwei chau fu no regular wind exists, there being occasional squalls, due to thunderstorms, etc.

The up-river wind blows more regularly and with greater force during the winter, and is very useful to upward-bound junks, as it follows the reaches of the river, making a fair wind. June is the rainy month at Chungking; April and May at Ichang.

Trade.—The Upper Yangtze is the outlet for the province of Szechuen, which, owing to size, population, wealth, and resources, may be termed the empire province of China.

The principal imports to ports above Ichang are cotton yarn (Indian and Chinese), dyes, needles, raw cotton, foreign piece goods, long seaweed, native cloth (known as nankeen) from Shasze, and isinglass; and the exports from the ports are opium, white wax, medicines, and goatskins.

Junk traffic.—There is considerable junk traffic between Ichang and Chungking, but the up-river trade practically comes to a stop by the middle of June, and it is not resumed before the middle of September or later, according to the condition of the river. The cause of this cessation is not the danger (that from the huge whirlpools is really serious), but the expense is doubled, as heavier crews are needed and have to be paid for perhaps three months instead of one; the wind, which is fair up the gorges from November to April, has ended, and without a fair wind parts of the gorges are actually impassable by large junks relying on man power alone, as they may in summer have to wait days for a fair wind.

During winter, at low river, the upward journey from Ichang to Chungking averages 4 to 5 weeks, depending on the amount of upriver wind between Ichang and Kwei chau fu, above which there is but little wind at any time. The junks are tracked up, sailing when the wind is fair.

During summer, when the river is high, the upward journey may take as much as 3 months, depending greatly on the number and strength of the freshets experienced, as during freshets junks secure to the bank.

The downward journey occupies 6 to 12 days, depending on the rate of the current, the amount of head winds experienced, etc. The junks descending have their masts down, and drift with the current, steerage way being given by means of large sweeps and yeulos. On both upward and downward journeys the junks are steered by long bow sweeps in addition to a powerful rudder. It is stated that 10 per cent of junks are wrecked usually on the upward journey.

Steam navigation—Pilots.—The Upper Yangtze between Ichang and Chungking can only be navigated in safety by thorough local knowledge, gained by experience in making passages both up and down the river at its various levels of water. Good and reliable pilots may be obtained at Ichang through the shipping hongs. These men have been brought up on the river and have piloted large junks up and down. It is only by thorough local knowledge that the strongest current can be avoided, and advantage taken of slacker water and eddy currents with safety. Also the river presents a totally different appearance with the rise and fall of the water; and the pilot has not only to know the positions of the innumerable out-lying rocks but has to be able to tell, by glancing at the bank, if he can or can not pass over them. In passing traffic, too, especially at narrow places, they are invaluable, as they know from experience which way an approaching junk is likely to be set, and how best to avoid collision. They also know the best securing places along the banks according to the height of the river, as anchoring, except in a few places, is impracticable above Ichang. It must be remembered that at present they have no knowledge of steam vessels, and are apt to forget that a steamer does not possess a bow sweep and tracking hawser like a junk.

Special fittings, such as capstans, bearing-off spars, bamboo hawsers, etc., are necessary in navigating this part of the river.

Danger of collision.—On the upward journey in a steam vessel there is much more risk of collision than on the downward. The risk of collision is greatest at the foot of rapids, where the channel is narrow and the downward-bound junks are practically taken charge of by the current, and, moreover, the ship herself, when in the swirls and eddies prevalent at the foot of rapids, is liable to deviate from her course even with the most careful steering, so with the greatest care on the part of both vessels a collision may occur. It is absolutely essential for safety to have the downward-junk traffic suspended at the worst rapids during the ascent of a steam vessel. In descending the same risk does not occur, as a steam vessel on approaching a rapid, or bad place, can see if she is likely to overtake a junk, and can ease, or even stop till the junk has passed beyond the dangerous part.

Ichang to Wan hien.—This part of the river is not suited for navigation by cargo-carrying steamers during the low-river season or from November to May.

The Kung ling, Shin, and Hsin lung rapids are too dangerous for a steamer to attempt with Chungking watermark below 15 feet.

In addition to these, the numerous smaller rapids would entail frequent steaming at full speed and consequent strain on engines, and delays would be caused from the necessity of having to use hawsers. Further, some narrow channels at low river above Wan hien render navigation difficult by a side paddle wheel cargo-carrying steamer, which is the best type for ascending the rapids below that place. From May to November, though the majority of rapids have disappeared with the rise of the river, some bad ones remain and new ones are formed; the narrow gorges become dangerous, the whole distance requires hard steaming, and maneuvering power of the highest order is necessary to counteract the effect of swirls and offsets of current.

Ascent to Chungking.—The best time for ascending is undoubtedly in spring, when the river is just commencing to rise, because at this season the general rise of the water is much slower than the corresponding fall in autumn; further, the fluctuations of rise and fall, which occur at this season, assist in negotiating the various rapids, according as they improve or get stronger with a rise or fall of the water. Thus H. B. M. S. *Woodcock* and H. B. M. S. *Woodlark* left Ichang for Chungking on April 5, 1900, when the watermark at Ichang was at 6 feet 3 inches; they remained till the following day just below the Ta tung tan, and then proceed without difficulty to just below the Shin tan. On April 7 they passed through this rapid with ease, although the river had only risen 8 feet above its zero mark. This small rise, however, was sufficient to change the

Shin tan from a fast and dangerous rapid, through which the ships could not have possibly steamed, into a comparatively easy one. On April 8 the Ye tan was reached, and owing to the small rise (the watermark at Ichang being 10 feet 6 inches above zero), it was running very strongly, and neither ship could attempt to steam it. On April 13 the water (as was expected) fell 3 feet 7 inches, and the *Woodlark* steamed over with some difficulty. There were several other occasions in ascending to Chungking, when the fluctuations of the river greatly assisted both ships in passing the rapids.

Next to spring, autumn is the best time for ascent, but when the fall is a steady one, without the fluctuations of rise and fall so helpful in spring, and should a vessel take the ground at this season she may remain fast till the river again rises.

The worst time for ascent is at very high or very low river. At high river the whole passage is against a swift current with heavy swirls and eddies, intercepted by strong running rapids such as the Ye tan, Niu ko tan, Pao tse tan, Huang shi tsui, Hu tan, etc. Freshets during summer are also a source of danger. At very low river the Kung ling tan, Shin tan, and Hsin lung tan are serious obstacles. The Kung ling tan is then dangerous, not so much from the rate of its current but from its channel being studded with rocks, which make the navigable channel exceedingly intricate. The Shin tan and Hsin lung tan both have at low river an extremely strong current, and their navigable channels are then narrow on account of rocks.

Descent from Chungking.—It is considered that a steam vessel could not descend from Chungking to Ichang at very low river. The Shin tan and Hsin lung tan are nasty rapids to pass at this season, but the Kung ling tan is then probably impassable, on account of its intricate channel, especially for a vessel of any length. At other seasons a vessel could descend, but with danger at very high river, on account of the heavy swirls and eddies which exist and make the gorges, especially the sharp turns at the entrance to Fung seang gorge and in Wu shan gorge, very difficult for a steam vessel of any length to pass safely.

Ascent of rapids.—It is at the lower end of a rapid where danger exists. Here, at some of the principal rapids, close up to the entrance of the tongue current (so called from its shape, the base of the tongue being at the upper end of the rapid) there are strong swirls and eddies, and should a vessel fail to enter the tongue stem on disastrous results are likely to occur. Once in the tongue and in the strength of the current a ship is perfectly under command and can be maneuvered with safety.

In ascending, it seems advisable, when in doubt about a rapid, to secure below and examine the rapid before proceeding; and it must be remembered that a rapid may improve in a few hours, depending on the rise or fall of the river.

Descent of rapids.—There is little difficulty in descending rapids, but a vessel should be kept at full speed whilst passing over; by this not only does the vessel steer better, but the currents and swirls have less time to affect her. In descending the river generally, where there are swirls, strong water, or sharp turns, it is safer to keep the vessel at full speed.

Securing places.—There are numerous places along the banks where a vessel can secure, but there are some reaches, which, owing to rocks or strong currents, make undesirable securing places. It is well to fix on some good securing place beforehand, allowing plenty of time to reach it before darkness sets in.

When securing to the bank, a place where a back current is running should, if possible, be avoided, and as soon as the ship is secured a tide pole or other mark should be placed at the water's edge and carefully watched to prevent the possibility of grounding, as it is not uncommon for the water to fall 15 to 20 feet in a night in the upper reaches of the Yangtze.

Rise of the river.—As an instance of the great rise of the river in the gorges, a house situated 200 feet above low-river level was destroyed by the disastrous floods of 1870.

Lifeboats, known as the red boats from the color they are painted, are stationed at each dangerous place between Ichang and Chungking.

The Kialing Kiang (Chungking Siao Ho), a northern tributary of the Upper Yangtze, flows into the main stream, with which it makes a right angle at Chungking. H. M. S. *Woodlark* ascended it to Ho chau in July, 1902.

About 6 miles above Chungking the Kialing is obstructed by the Shih munn ko (Stone gateway), where a large rock divides the river into two channels. That on the right bank is the deeper, but that by the left bank can be used when the river is high. The right-bank channel is about 100 feet wide. The *Woodlark* found no difficulty in ascending it against a 3-knot current, as the passage is straight, but it is said to be a very bad place when a freshet comes down before the rocks are covered.

The Chi kwan tan, running about 6 knots, is a race with strong swirls off the submerged rocks below the village of Pei yang se, which is 3 miles above the Shi munn ko, and the Li tan, with about the same rate, is 3 miles farther on. Neither offers any serious obstruction.

There are bad swirls at Tseh sia tze. Tu to is a fair-sized village, from which a lot of coal is dispatched. In the Kwan yin hsia or first gorge, the entrance of which is 1½ miles above Tu to, the water is quiet, but the turn at its upper end is sharp, and the water swirly at both ends.

A large rocky reef runs out from Pei pei village, causing bad swirls, and the turn above the reef is sharp. The water in the Wunn tong hsia or second gorge, about 2 miles above Pei pei, is quiet, but swirly at both ends.

There is a good securing place on the right bank opposite and a little above Tsao kai tze village.

The Chao munn tan is about 2 miles above Tsao kai tze, but it does not appear to cause much difficulty. The water in the San hsia or third gorge, about 1 mile farther up, is swirly. There are bad swirls and a sharp turn round a shingle spit extending from the right bank, at about 4 miles below Ho chau.

There is a safe securing place on the right bank of the Fu ho opposite the town of Ho chau, the bank being rock and steep-to, with numerous holes in the rock for making hawsers fast.

The current in the river is very changeable, depending a great deal on the height of the Yangtze at Chungking.

Ho chau is distant 48 miles from Chungking and at the junction of the Kialing kiang and the Fu ho. It is a large walled town, with a population of about 10,000 families, and it has no particular industry, but it is a large distributing center.

The Fu (Sui ning ho), which joins the Kialing from the northwest at Ho chau, was ascended by the *Woodlark* as far as Ngan dhu shien (An chu), a distance of 100 li above Ho chau, in July, 1902. The river is without gorges; its reaches are fairly long, and no rapids were met, but there are sharp turns.

The Kii ho (Sui ting ho) flows into the Kialing from the eastward, at 5 miles above Ho chau.

Junk traffic.—Of these three rivers the Fu ho is by far the most important commercially. Junks 135 feet long, 14 feet beam, with a draft of 3½ feet and a capacity of 80 tons in summer and of 1¾ feet and 40 tons in winter, load coal at Hwong to tsu, a village above the first gorge on the Kialing, and carry it to Yang tu chi, 380 li above Ho chau, and return with salt.

The upper reaches of the river during winter are dredged by small boats to allow the passage of the big junks, but even then there is in some places barely enough water to float them, and the channel is occasionally so narrow that an upward and downward bound junk can only just pass one another.

CHUNGKING TO SUI FU, ETC.

The Upper Yangtze above Chungking is of quite a different character to that below, wider, and with a current having a rate of 2 to 2½ knots only at low river, but of about 6 knots at high river. The country is much more open, and the river runs between comparatively low hills, the banks having long stretches of large shingle, interspersed with rocky ledges.

With the water at about 5 inches above zero at Chungking this part of the river is nearly free from rapids, there being only two of any strength between Chungking and Sui fu, a distance of 234 miles. With the water at 30 feet above Chungking zero the rapids are not formidable, the worst being at Long men tau, in Lat. 29° 12′ N., Long. 106° 10′ E.; at Lao lou cho, in Lat. 28° 53′ N., Long. 105° 34′ E.; at Leang tuo nien chi, in Lat. 28° 57′ N., Long. 105° 32′ E.; and at Ko pi tan, in Lat 28° 46′ N., Long. 104° 52′ E.; but these are nothing compared to those between Ichang and Chungking. The least depth between Chungking and Sui fu, with Chungking watermark at zero, was 5 feet at Siao chi pei. This is the worst place, as the channel is narrowed to about 30 yards by shingle banks. It is considered that vessels with a speed of 12 knots could navigate up this part of the river without great difficulty at any period, except during the July freshets.

Ho kiang hien is a well-built town on the right bank of the Yangtze, which is here 620 yards wide, and at the confluence of the Chi shui. The Chi shui is a small river flowing northward, down which small boats bring wood (fir), but the chief traffic is carried on by rafts.

To kiang.—This river joins the Yangtze from the northwestward at Lu chau, situated about 125 miles above Chungking. It is probably navigable at high river by stern-wheel steamers 80 feet long and 2½ feet draft nearly to Nei kiang, but unnavigable at low river. The To kiang is known locally as the Siao ho, or small river, and the Yangtze as the Ta ho, or great river.

Lu chau town is built on the left bank of the Yangtze and the right bank of the To. It has a large export trade of salt, sugar, and timber. The taotai for the Yung ning district, south of the Yangtze, resides here. The Yangtze abreast of Lu chau is 530 yards wide and the anchorage is fairly good, but it is advisable to lay out hawsers to the shore in addition to anchoring.

Freshets.—The Yangtze in the vicinity of Lu chau is visited, during high river, by about 5 sudden bad freshets yearly, and usually in 2 of these the river is so dangerous that native traffic is stopped. Between the freshets the average current is strong, but there are places where it is slack.

Na chi is a small town, with a Roman Catholic Church, on the right bank of the Yangtze and at the left bank of the mouth of a small river running in from the southward. The Yangtze here is about 550 yards wide.

Kiang an hsien, situated at the mouth of a small river flowing in from the southward, is chiefly noted for its fancy carving in bamboo.

Sui fu (Hsu chau fu), a large city with a population of 150,000 (estimated), is situated on a high, wooded, rocky promontory between the Min or Fu ho and the Yangtze, or Kinsha, as it is locally known here. It is the entrepôt of the large transit trade between Szechuen and northern Yunnan, as well as a considerable distributing place, and it also does a large business in silk, opium, and sugar.

At Sui fu the Yangtze is known as the Siao ho, or small river, and the Min as the Ta ho, or great river.

Navigability.—In August, 1902, H. B. M. S. *Kinsha*, drawing 6½ feet, ascended the upper Yangtze from Chungking to Sui fu, the water being 30 feet above Chungking zero. The principal difficulties in making the passage were owing to the sharp turns and the rapid current. The *Kinsha* anchored in the Kinsha river opposite the south gate of Sui fu, but the holding ground was bad, and the vessel shifted to the anchorage in the Min at about ½ mile above the north gate of Sui fu.

On the passage back to Chungking great caution was necessary to keep clear of junks and boats, and owing to the swirly water the vessel was kept at a speed of 12 knots from Lu chau to Chungking to insure good steering.

A good pilot must be employed in navigating this part of the river, as there is not much room to spare; junk pilots, men who have been on the river in junks all their lives, may be obtained, but they require assistance in steam vessels.

Fu ho (Min river).—Navigation is feasible for light-draft steamers of suitable size on this river, which joins the upper Yangtze from the northwestward at Sui fu, to Kiating fu, a distance of 95 miles, even at an ordinary low river. Kiating fu is at the junction of the Tung and Ya rivers with the Min; it has a large export trade of white wax, silk, hides, horns, and bristles. Above Kiating fu the river shoals considerably, and only during the mid and high water seasons could a light-draft vessel reach Kiang ko, a farther distance of 72 miles, which place appears to be the general terminus for river navigation; it is 1 day's journey overland from Cheng tu, the capital and vice-regal seat of Szechuen, though during high river Cheng tu may be reached by river. The river begins to rise in April, falls again, and the real rise begins at the end of May; thence to August freshets caused by heavy rains in the mountains swell the steady rise due to snow melting. Below Kiating the Min is then of considerable width. The range of the water at Sui fu appears to be about 60 feet, at Kiating 22 feet, and at Kiang ko about 4 feet. The current in the navigable part of the Min averages 4 knots in summer, but it is considerably more at the shallows and rapids and also during freshets.

Native pilots report the first 30 miles above Sui fu as the worst at all times for navigation; above that the country is more open, and the river wider and shallower.

Trade up and down the Min is considerable, but it is chiefly carried in smaller boats (wupans), which run straight up to Cheng tu. Junks of 30 to 40 tons displacement with salt, and a few others of that size with different cargo, ascend the Min to about 1¼ miles below Kiating. In January the junks load to 2½ feet draft; at high river to 5 or 6 feet.

Sui fu to Ping shan hien.—The Yangtze above Sui fu is known as the Kinsha, and from Sui fu to An pien, 20 miles farther up, it was 300 to 600 yards wide in August, 1901, with a current of 4½ knots and navigation easy. Between An pien and Ping shan hien, a distance of 26 miles, rapids and sunken rocks, with a swirly current of 5 to 6 knots, are said to render navigation difficult at low river.

Trade by junk in this part appeared to be very small in amount; it was reported to be greatest in spring and autumn. Some foreign goods proceed up to An pien, and thence up the Heng kiang into Yunnan province. Some junks of 20 tons are employed in the coal trade from mines in a gorge of the Kinsha above An pien.

Above Ping shan hien rapids are reported to stop navigation by native boats at highest and lowest rivers, and to be always bad. Passengers and cargo for Man i tse, 50 miles above Ping shan, usually take the land route. Above Man i tse no boat traffic obtains except on short stretches of the river.

CHAPTER V.

YANGTZE RIVER TO NIMROD SOUND.

Tung hai, or Eastern sea, lies between the east coast of China and the Liu kiu islands and Kiusiu, and extends southward from a line joining the mouth of the Yangtze and the southwestern point of Korea to Formosa. Its climate is temperate; gales are common, with occasionally typhoons, and snowstoms in winter; the summer is fine. The currents, beyond the influence of the Yangtze and coast tidal streams, seem to be irregular, except in its eastern part, through which the Japan stream flows northeastward and northward.

Chusan archipelago includes the large group of islands off the eastern coast of China, between Yangtze cape to Nimrod sound, to the southward.

The islands of the archipelago are bold and rugged; the coasts are rocky, generally faced with cliff, and there are off-lying pinnacles, the majority of which are above water. The summits of the hills are often sharp and well defined, their slopes sterile, covered with slabs and loose bowlders of rock interspersed with grass.

There are small patches of cultivation in the valleys and sheltered corners, and in the larger islands, such as Chusan, richly cultivated plains and many densely populated towns.

Caution.—The water of the sea is impregnated with mud, being especially foul toward the last of the ebb, and nothing can be seen in it.

Pinnacle rocks are only to be detected by the rippling of the tide, but often there is no indication of their existence.

Tidal streams.—The tidal streams around and between the islands are very rapid, sometimes attaining a rate of 7 and 8 knots; and the tide ripplings are numerous and dangerous for boats when there is much wind. As a rule, the sea does not run high, but the day before the approach of a typhoon, and during its continuance, a heavy swell rolls in upon the rock-bound coast. The direction of the tidal streams eastward of Chang tau is rotary, turning with the hands of a watch; but in the straits between the islands, in the mouth of Hangchow bay and close to the land, it follows the conformation of the coast. Clear of local influences, the following is a broad guide:

The first half of the flood runs in directions from south to west, the last half from west to north.

The first half of the ebb runs from north to east, the last half from east to south.

Fogs are not uncommon from March to July, inclusive. No attempt should be made to proceed among these islands during a fog; a vessel touching the ground in these rapid tidal streams at once heels over, much or little, according to her build; therefore close water-tight doors and scuttles when there is any risk of such an accident. Anchorages are numerous.

Gutzlaff island lies about 16 miles southeastward of Yangtze cape and is of rounded shape and about 500 yards wide, 236 feet high, with a ledge of rocks off its northeastern side, terminating in a conspicuous black rocky islet 9 feet high. Eight hundred yards northward of Gutzlaff is a rock 35 feet high, and 200 yards southeastward of this rock is a rock which dries 6 feet at low water.

The landing place is on the western side of the island.

Light.—A white light-house, 46 feet high, on the eastern end of the summit of Gutzlaff island exhibits at 283 feet above high water a flashing white light, showing a lightning flash every 5 seconds, visible from a distance of 24 miles.

Fog signal.—In answer to a vessel's fog signal three guns are fired, with an interval of 2 minutes between each, and if the vessel's fog signal continues to be heard the firing is repeated after an interval of 15 minutes.

Position.—The light-house is in Lat. 30° 48′ 37″ N., Long. 122° 10′ 13″ E.

Anchorage.—Vessels intending to remain at anchor off this island for any length of time should anchor with the light-house just open south of a white hut on the southwest shore of the island, bearing 64° and distant about 800 yards from the landing place.

Tides and tidal streams.—It is high water, full and change, at Gutzlaff island at 11h. 30m.; springs rise 15 feet. Between West Volcano island and Gutzlaff the west-going stream begins at about 1 hour after low water, and runs from 267° to 290° 1 to 6 knots; the east-going stream begins at about 1 hour after high water, and runs from 76° to 98° at the same rate as the west-going stream. Each stream attains its greatest rate during the third and fourth hours. From high water to low water is about 6¾ hours, and from low water to high water about 5¾ hours, but there is considerable variation. Further seaward the streams become more rotatory, with a less rate, but toward Hangchow bay they become more direct, with an increasing rate. The direction and rate of the tidal streams northward of Gutzlaff are shown on the chart.

Telegraph station.—Gutzlaff is a telegraph station.

Storm signals.—The Shanghai local weather signals, as well as storm warning signals, are shown at the light-house.

Fishing stakes, consisting of bamboo poles about 5 inches in diameter and strongly fastened together, have been reported in a position about 7 miles east-northeast from Gutzlaff.

Telegraph cables.—Five telegraph cables are landed near a small cable house on the western side of Gutzlaff island. The cables take the following tracks from the island:

1. North-northwestward for about 16 miles, and thence about 308° and along the southern shore of Yangtze kiang to Pheasant point, Wusung river.

2. Westward for about 1,400 yards north-northwestward about 14 miles, thence 301° and along the southern shore of the river to Pheasant point.

3. Northward, curving round the small islet northward of Gutzlaff island, thence about 102° for about 13 miles, northward of the Sentinels and Saddle islands, 1,400 yards northward of North Saddle island and toward Nagasaki.

4. West-southwestward about 1,000 yards, then curving round eastward and passing about 1,200 yards southward of Gutzlaff island, eastward for about 3 miles, 66° 5½ miles, 57° 21 miles, and toward Nagasaki.

5. South-southeastward toward Amoy, passing about ¾ mile westward of Parker islands, and about 2½ miles northward of Lu kon island.

Vessels should not anchor in the vicinity of these cables, the tracks of which are shown on B. A. chart No. 1,602.

Hen and Chicks lie about 8½ miles southwestward of Gutzlaff, are precipitous, 132 feet high, the northern point of which is broken up into several rocks 30 to 40 feet high, and two rocks, one of which is 2 feet above high water, and the other dries 7 feet at low water, lying 1 to 400 yards northward of it.

Rugged islands.—Southeast horn, the eastern of these islands, lies about 13 miles southerly from Gutzlaff; it is about 1,600 yards long and ¼ mile wide, and 266 feet high. There is rock, drying 8 feet, about 200 yards southward of its southern point. A rather smaller island lies about 213°, 1,600 yards from the Southeast horn; this island is 250 feet high; a rock 16 feet high lies off its southwestern point, and shoal water extends nearly ¼ mile southeastward of it.

Da yung san, 3½ miles eastward of Southeast horn, is the largest and highest of the group; it is 2¼ miles east and west, 1¼ miles to a few yards wide, covered with grass and cultivation, and has 2 conspicuous peaks 678 and 630 feet high, respectively. It is inhabited, the principal village being in the Southeastern bay.

A rock, which dries 8 feet, lies with the highest peak of Da yung san bearing 285°, distant 1¾ miles.

Huxley rock is a patch 100 yards across, with 2 feet least water over it, and from its shoalest part the highest peak of Da yung san bears 337°, distant 1,750 yards. The highest peak of Tripoint island, just open eastward of the southern point of Southeastern bay, 337°, leads 600 yards eastward of the rock.

A rock awash lies northward of Da yung san, with the highest peak of that island bearing 187°, distant 1¾ miles.

Several islands and rocks, with much shoal water, lie between Southeast horn and Tripoint island, which lies 5 miles northwestward.

These islands are from 139 feet to 374 feet in height. Spire islet, ½ mile southeastward of Tripoint island, is a remarkable pinnacle 214 feet high.

Southwest horn is the western of a chain of islets extending westward from the western point of Da yung san. Southwest horn is about 200 yards wide, 105 feet high, and bears 270°, 4¼ miles from the western point of Da yung san.

Light.—An intermittent white and red light having a period of 20 seconds, thus: Light 10 seconds, eclipsed 10 seconds, is exhibited at a height of 95½ feet above high water from a light-house painted white on the western summit of Southwest horn island.

The light shows red over an arc of 105° between the bearings 290° and 186°, and white over the rest of the horizon.

The white light is visible 15 miles and the red light 8 miles. Between the bearings 326° and 323° the white light is obscured by land.

Fog signal.—Consists of 2 guns fired with an interval of 3 minutes between them.

These guns will be fired during thick or foggy weather whenever the light keepers hear a bell, fog horn, steam whistle, or any other sound indicating the proximity of a vessel, and if the vessel's fog signal continues to be heard the signal will be repeated after an interval of 12 minutes.

Tripoint island (Hsiao yung san), about 247° 2 miles from Da yung san, is 1$\frac{4}{10}$ miles long, northeast and southwest, of variable breadth, and has three peaks of nearly equal height, the southern and highest peak being 459 feet high.

Northwest Horn, a rock 75 feet high, lies 304° 2$\frac{2}{10}$ miles from the western point of Tripoint island, three small islands lying between.

The islands of Rugged group, excepting the small ones, are inhabited by a fishing population.

Hoar rock, 288° 1,700 yards from the summit of Northwest Horn, is a pinnacle with a depth of 4 feet over it. This is the northwestern rock of the group.

Anchorages.—There is good anchorage off the southeastern bay of Da yung san in 4 to 6 fathoms, mud, and half a mile southwestward of Tripoint in 5 to 6 fathoms, mud, and also southeastward of the Northeast Horn, the northeastern island of the group, in 3 to 4 fathoms.

Tidal streams run through and by this group at a rate of 4 to 6 knots at springs, forming tide ripplings off the points and in the passages, which are dangerous for boats in strong winds, and except as above given no anchorage is recommended.

Parker islands are a group of more than 25 islands, with many small islets and rocks, including Raffles, Senhouse, Chesney, Elliot, Morrison, Davis, Napier, Bonham, Bruce, Brooke, and Pirie islands, extending about 16½ miles east and west, and 12 miles north and south. These islands lie southeastward of Gutzlaff, there being a clear passage between nearly 11 miles wide.

Raffles island, called by some of the natives Su tsu san or Lion hill, is 5¾ miles long east and west, and half a mile to 3$\frac{3}{10}$ miles broad, the greatest breadth being at the western end. It has many peaks, the highest being at its western part and 715 feet high.

Anchorage can be obtained in moderate depths nearly all round it, but that on the southern side is reported to be unsafe. At the northeast end above the bay at that part there is a slope of white sand which is conspicuous from the eastward, and shows in misty weather when little else is seen. This island is inhabited.

Chesney island, called by some of the natives Kin ke san or Golden Pheasant hill, is separated by a narrow boat channel from the northern point of Raffles island; it is 1 mile long east and west, 5 to 9 cables broad, 437 feet high, and inhabited. There is a small islet off its eastern point 126 feet high, inside of which there is a good boat harbor.

Anchorage.—The anchorage westward of this island is not desirable, owing to the strong tidal streams and undercurrents which keep a vessel tide rode.

The surface current, which attains a velocity of from 2 to 3 knots, is much influenced by the prevailing wind, and even at spring tides does not run to windward.

Rock.—A rock, which dries 2 feet at low water, is situated in the anchorage at a distance of 600 yards 258° from the northern point of the island (175 feet) north of Chesney island.

The Sentinels.—A number of islets and precipitous rocks lies off the northern end of Chesney island, the five outer ones being named the Sentinels. The outer Sentinel, 22° 2 miles from the summit of Chesney island, is 96 feet high; the inner and highest is 143 feet high.

Outpost rock lies 128° 2½ miles from the outer Sentinel, is 20 feet high. A sunken rock lies about 200 yards east-northeastward of it.

Cairnsmore rock lies 78° 2$\frac{6}{10}$ miles from the eastern extreme of the northeastern point of Raffles island, is a pinnacle with 7 feet over it, the top of the rock being not more than 4 feet across. The sea never breaks on it, and it is not indicated by a disturbance of the water except on a calm day, when the tidal stream ripples on it.

Two rocks, 50 yards apart, lie 38° 1,500 yards from the eastern extreme of the northeastern point of Raffles; one is awash at low water.

Senhouse island, 1¾ miles southeastward of the eastern part of Raffles island, is about 2¼ miles long, half a mile to 1¾ miles broad, and 723 feet high. The southern and eastern coasts of Senhouse island are bold and rugged; there are several off-lying islets and rocks, of which the Nut, at 170° 1 mile from the eastern point of the island, is 71 feet high, and conspicuous. A cluster of rocks extends 200 yards off the southeastern point of the island; the outer rock dries 5 feet. The island is inhabited, and a great resort of fishermen.

Bruce island, northwestward of the western part of Senhouse island, is 1¼ miles long northwest and southeast, 50 yards to 1,200 yards wide, and has three peaks, the western being 545 feet high. There are a few huts on the western end of the island.

The channel between Bruce and Senhouse islands is 300 yards wide and not available for shipping, as the tidal streams are rapid in it and a depth of only 11 feet can be depended on northward of the channel.

There is anchorage between and northward of Senhouse island and Bruce island, with shelter for vessels of 14 feet and less draft from any except northerly winds, but the fishing nets about are very numerous and extend halfway to Raffles island.

Brooke island, about 1 mile southwestward of Bruce island, is 1 mile long northwest and southeast, covered with grass, and has a well-defined peak 375 feet high. It is not inhabited.

Cortland rock, 128°, 600 yards from the southeastern point of Brooke island, is awash at low water. There is foul ground between the point and rock.

Napier island, immediately southwestward of Raffles island, is 1½ miles long east and west, 200 to 500 yards wide, and has a sharp summit 368 feet high. It is inhabited.

A small light-house on its northern extreme exhibits a light to guide fishermen, and on its northeastern side there is an excellent boat harbor in which many junks are usually found.

There are several islets and rocks southward of Raffles island which are shown on the chart.

The tidal streams in the channels between Napier island and Raffles island are very rapid.

Elliot islands, 1¾ miles northwestward of Raffles island, are a group of two islands and three islets. The higher and larger of the islands is ¾ mile long north and south, precipitous on its eastern side, and 471 feet high. It is inhabited on the western side.

Good anchorage can be obtained between the Elliot islands and Raffles in 4 to 8 fathoms. There are several rocks above water on both sides of the channel, and one rock which dries 8 feet lies 72°, 600 yards, from the southern point of the larger Elliot island.

Bisbee rock, 213° 1,400 yards from the southern point of the southern Elliot island, is black, rugged, and 44 feet high.

Morrison islands, about 7½ miles southwestward of the Elliot islands, are a group of four islands, the largest and highest of which is 1 mile long northeast and southwest, 300 to 1,000 yards broad, covered with rocks and grass, and has two sharp peaks 487 and 439 feet high, respectively. On the western side of the island there is a bay, full of mud, with a village at its head.

There are several islets and rocks around the group.

Richardson rock lies 1 mile northward of the northern Morrison island and with the two peaks of the largest Morrison island in line 205°. The rock, which has 22 feet over it, is a pinnacle only a few feet across; the sea does not break on it, and except in a calm, when the rippling caused by the tidal stream shows its position, it is not indicated in any way.

Davis islands, 3¼ miles southeastward of the Morrison islands, are a group of five islands, with several islets and rocks. The largest, highest, and western island is 1,800 yards long northeast and southwest, 700 yards wide, and 491 feet high.

Webb rock, 199° 1,000 yards from the southwestern point of the largest Davis island, is a pinnacle about 4 feet across, with 3 feet water over it and 16 to 20 fathoms around within 100 yards, the deepest water being between the rock and the island.

The rock, except in a calm, when it is apparent from the rippling about it, is not indicated in any way.

Skinner rock, 316° 600 yards from the northeastern point of the largest Davis island, has 9 feet over it and 18 to 20 fathoms around.

Anchorage can be obtained in 9 to 12 fathoms, mud, with the summit of the highest Davis island bearing 357° and Gangway rock just open southward of the southern extreme of the island. In the approach to this anchorage avoid Webb rock.

In the western semicircle of a typhoon and unable to make the mouth of the Yangtze, this is a convenient anchorage while waiting for the storm to pass. The tidal eddies are troublesome, but this can not be evaded at many anchorages; no swell has been experienced here, although it has been observed running 25 feet high from the eastward, southward of Bonham island.

Gangway rock lies 271° $2\frac{4}{10}$ miles from the southwestern point of the largest Davis island, is precipitous and 99 feet high, with a sharp double summit.

Patterson rock lies 194° 500 yards from Gangway rock, is a small pinnacle with 3 feet over it.

Andersen islets lie 74° $1\frac{6}{10}$ miles from the northeastern point of the largest Davis island, and are 3 rocks close together, the highest being 76 feet high. Foul ground extends 400 yards southeastward from the islets and terminates in a rock which dries 4 feet.

Pirie island, 1,800 yards northeastward of the eastern Davis island and 241° 2 miles from Bonham island light-house, is precipitous and 216 feet high. Close southward of it is a remarkable thumb rock 103 feet high, and 200 yards farther southward is a rock 37 feet high.

The Button lies 346° 2¼ miles from Pirie island, is a small rugged, black, rocky islet, 43 feet high; a rock with 5 feet over it lies 200 yards eastward of it; the soundings around are 9 to 11 fathoms, mud, except close northward and southward of the islet, where there is deeper water owing to the scour of the tidal streams.

Button rock.—Light.—An intermittent white light every 15 seconds, thus: Light, 12½ seconds; eclipse, 2½ seconds, is exhibited from a black cylindrical tower, 32 feet in height, erected on the eastern end of Button rock. The light is elevated 67 feet above high water, and is visible from a distance of 10 miles.

Fog signal.—During thick or foggy weather a bell is struck by machinery once every 10 seconds.

Bonham islands are three islands and some islets and rocks extending north and south about $1\frac{6}{10}$ miles. Bonham island, the southern and largest island, is 1,600 yards long north-northeast and south-southwest, 600 yards wide, precipitous on the eastern side, and has a well-defined summit 388 feet high. The landing place is on the western side of the island.

Light.—A circular light-house, 47 feet high, painted in red and white horizontal bands, on the southern shoulder of Bonham island, exhibits 237 feet above high water a revolving light, showing white and red alternately every 30 seconds, and visible 22 miles.

The light is obscured by the high land of Bonham island between 192° and 225°, and by Elliot, Raffles, and Senhouse islands from 165° to 259°, with the exception of rays between 166° and 167°; between 175° and 176°; between 179° and 181°, and between 227° and 237°.

Fog signal.—In answer to a vessel's fog signal two guns are fired, with an interval of 1 minute between them, and if the vessel's fog signal continues to be heard the firing is repeated after an interval of 8 minutes.

Position.—The light-house is in Lat. 30° 36′ 56″ N., Long. 122° 25′ 05″ E.

Anchorages.—There is good anchorage southeastward of Bonham islands in 6 to 9 fathoms, shelved from northwesterly winds; there is indifferent anchorage on the western side in 6 to 9 fathoms, with the light-house bearing 132°, distant 600 to 800 yards, sheltered from northerly and northeasterly winds; but here the tidal eddies are inconvenient and strain the cables.

Tides.—It is high water, full and change, at Bonham island at 10h. 38m.; springs rise 13 feet, neaps 10 to 11 feet; neaps range 6 to 7 feet. The highest tide is about 12 hours after full and new moon.

Bonham strait, between Bonham islands and Pirie island, is 2 miles wide and has depths of 25 to 7 fathoms.

Bonham rock.—At 312° 1,200 yards from Bonham island light-house is an islet, 74 feet high, and at 236° 300 yards from this islet is Bonham rock, awash at low water, with shallow water lying between the rock and islet. From the rock the light-house bears 118°, distant 1,300 yards.

Directions.—From a position at 111° 1 mile from Bonham island light-house, or nearly in mid-channel between Bonham and Pirie islands, a 336° course made good leads ½ mile off Bonham rock, half a mile eastward of the rock eastward of the Button, and direct to the fairway bell light buoy at the entrance of the Yangtze kiang. The tidal streams must be considered and allowed for. Caution is necessary on account of Bonham rock. The distance from the Button to the fairway buoy is 27½ miles.

Cust islands are 2 islands 1$\frac{3}{10}$ miles eastward of Bonham island. Purey island, the western, is 1,400 yards long and very narrow in one place; its highest part, at the northwestern end, is 250 feet high; a rock 12 feet high lies 200 yards from the southeastern point of Purey island, and a cluster of rocks above and below water extends nearly 400 yards off its southwestern point; the outer rock is 5 feet high.

The eastern Cust island, 800 yards eastward of Purey island, is 194 feet high.

Franklin rocks, 1 mile southeastward of Purey island, are two conspicuous islets, the higher and southern having a sharp summit 58 feet high.

Saddle group, northeastward of the Parker islands, consists of about 25 islands, numerous islets, and rocks.

North Saddle island is $2\frac{1}{10}$ miles long east and west, 300 yards to $1\frac{1}{4}$ miles wide, and covered with rocks and grass; the summit has two peaks, forming the appearance of a saddle, the highest being 782 feet high; the coast is rugged and in many places precipitous. There are three bays in the island named North, South, and West bays. The island is inhabited.

Churchill rocks extend nearly half a mile southeastward of the eastern point of South bay.

Two rocks, which dry 5 feet at low water, lie northward of the northern point of West bay and with the light-house bearing 99°, 600 yards.

Light.—A light-house, 54 feet high, upper part painted black, lower part white, on the northern point of North Saddle island, exhibits, at 273 feet above high water, a revolving white light which attains its greatest brilliancy every minute, and visible 24 miles.

The light is obscured southward from False Saddle to Elliot islands, or between 305° and 71°; also between 302° and 295°.

The keepers' dwellings are painted white.

A fog bank sometimes hangs over North Saddle island, obscuring both it and the light.

Fog signal.—In answer to a vessel's fog signal three guns are fired with an interval of 1 minute between the first and second, and 5 minutes between the second and third, and if the vessel's fog signal continues to be heard the firing is repeated after an interval of 10 minutes.

Position.—North Saddle island light-house is in Lat 30° 51′ 41″ N., Long., 122° 40′ 17″ E.

Anchorage can be obtained in moderate depths either in North bay, South bay, or West bay. The anchorage in West bay is difficult for boat work owing to the heavy tide rips. It is also for this reason uncomfortable for small craft. North bay is generally used, but in spring and late autumn northerly winds set in without much warning, and departure may be necessary at short notice.

Split island lies 60° 1,600 yards from the eastern point of North bay, and is a precipitous rock 183 feet high. The ground is foul between the island and the main.

Snaffle island, 300 yards southward of the southern point of North Saddle island, is 123 feet high. There is a small fishing village on its western slope.

Side Saddle islands are two islands 1¾ miles southwestward of North Saddle and joined together by a ledge of rock which can only be passed by boats at slack water and high tide. The eastern island is 472 feet high; the western, 346 feet. Both are inhabited.

There is good anchorage in moderate depths northward and southward of the western island and in the bay westward of the eastern island. Eight hundred yards northward of the middle of the westernmost island is a rock 28 feet high with a smaller rock close northwestward of it, and about 200 yards off the southern point of the eastern islet is a rock which dries 12 feet, and a quarter of a mile westward of this rock is a rock which dries 10 feet.

The anchorage southward of the western Side Saddle island is very secure with winds from west, through north, to east.

The Buckles, a group of islets and rocks, extend from the northern islet, which is 103 feet high, and situated nearly 1 mile from the western extreme of the Side Saddle islands, south-southeastward 1¾ miles. The southern islet has a cone-shaped summit 164 feet high, and a rock lies 300 yards southwestward of its southern end, which has 19 feet over it at low water.

Giffard rock, 700 yards west of the northern Buckle islet, dries 8 feet.

The Stirrups, a group of six islands, stretch 3¾ miles southward from the eastern end of the Side Saddle islands. The passage between the eastern Side Saddle and the northern Stirrup island is about ½ mile wide.

North Stirrups are three islands, the southern and highest being 262 feet high. The middle island has a remarkable bowlder 173 feet high, at 300 yards northeastward of its summit, which is 221 feet high. Between the two northern islands are many rocks, one of which is 30 feet high.

Middle Stirrups are two islands, much broken up, the higher and eastern being 114 feet high.

A small pinnacle rock with 12 feet over it, lies with the summit of the eastern Middle Stirrups bearing 258°, distant 900 yards.

South Stirrup is 400 yards long north-northwest and south-southeast, nearly 200 yards wide, and has a well-defined summit 126 feet high; a rock, which dries 4 feet, lies 300 yards northward of the island.

The Spur, 119° 1,000 yards from South Stirrup, is a perpendicular rock 58 feet high, like a milestone; and a rock above water lies 100 yards northward of it.

Bit rock, 172° 2$\frac{2}{10}$ miles from South Stirrup, is small, black, rocky, and 31 feet high; a rock which dries 8 feet lies 300 yards southeastward of it.

False Saddle islands, 5½ miles southeastward of North Saddle, are two islands with a boat passage between them at low water. The northern and larger island has two peaks, 521 and 517 feet high, respectively, giving the appearance of a saddle; the southern island is 321 feet high and precipitous on its northern side. Both islands are inhabited.

There is good anchorage in 4 to 6 fathoms, mud, in the bay westward of the southern island and southward of the northern, sheltered from winds, between northwest, through north, and east.

The Blinkers is a reef extending 1,200 yards southeastward of False Saddle islands; the largest and highest rock on the reef is black, 100 yards across, and 81 feet high.

The outer rock of the reef is small, 3 feet high, and in fresh winds there is a strong tide rippling off it. The passage between it and East Saddle island is 2 miles wide.

Bridle islands are 3 islands lying northwestward of False Saddle islands; the southern and largest is separated from False Saddle by a passage 100 yards wide; it is precipitous on its eastern side, 410 feet high, and a rock, which dries 11 feet, lies 200 yards from its northeastern part.

There is much foul ground between the two northern Bridle islands, and no attempt should be made to pass between them except in boats. The channel northward of the southern island should only be used in an emergency.

Rein island, 276° 1,200 yards from the northern Bridle island, is small, with a double summit 183 feet high. Some rocks above water extend about 400 yards both from its northern and southeastern sides.

Curb island, 303° 1$\frac{6}{10}$ miles from Rein island, is cone shaped, 300 yards wide, with steep rocky sides and a sharp summit 212 feet high. There is deep water around the island. The passage, 800 yards wide, between it and Snaffle island to the northwest, and that between it and Martingale island to the southward, ¾ mile wide, are clear and safe.

Martingale island, 158° 1,600 yards from Curb island, is 400 yards long north and south, 300 yards wide, and 142 feet high.

Girth island, 137° 800 yards from Martingale island, is about 200 yards wide and 135 feet high; two rocks, which dry 4 and 5 feet, lie respectively 200 and 300 yards northwestward of it; a rock which dries 7 feet lies 200 yards southeastward of it; and a rock which dries 4 feet, 500 yards south-southwestward of it.

Powell rock, about midway between Martingale and the northern North Stirrup, is a patch which dries 6 feet at low water.

Pillion island, 1,300 yards southward of Girth island, is 202 feet high. Near its southern end there is a remarkably sharp needle rock 19 feet high above the ground.

Pommels, 200 yards southward of Pillion island, are two remarkable pillar rocks, 60 feet high. A third rock above water lies southwestward of them and about 400 yards from the island.

Crupper islands are a group of three islands about 1½ miles southeastward of Pillion island and 2 miles west-southwestward of False Saddle islands. The middle and highest island is 173 feet high, precipitous on the southern and western sides, and northward of it there are two rocks which dry 6 and 10 feet, respectively, the outer being 500 yards distant from the island.

South Saddle island, about 2½ miles south-southeastward of the Crupper islands, is 2½ miles long and 2 miles broad, narrowing in places to half a mile. It has several peaks and one double summit, 651 feet high; is considerably higher than the others. The island is inhabited.

Anchorage can be obtained almost anywhere around it in depths of 3 to 10 fathoms, mud, avoiding the rock, with 20 feet over it, in the bay on the eastern side of the island. In the anchorage southward of the western island small vessels often drag their anchors, owing to the strong tides.

The Hoofs are two islets; the larger, 500 yards southeastward of the southeastern point of South Saddle, is 156 feet high, and the smaller, 400 yards farther southward, is 64 feet high. A rock which dries 10 feet lies 200 yards northwestward of the larger islet. Two rocks, 8 and 12 feet high, with some smaller rocks between them, lie 800 yards southwestward of the southern extreme of South Saddle.

Pony Saddle island is separated from the western end of South Saddle island by a pass 800 yards wide. This pass has a rocky patch in the center which dries 7 feet, and there is foul ground between this patch and Pony Saddle. The island has a double summit forming the appearance of a saddle, the western, which is 224 feet high, being the higher by a few feet. It is precipitous on both sides.

Whip islet, 200 yards northwestward of and connected with Pony Saddle by a reef, is 81 feet high, the western end being the highest part.

McCauley rock, 271° 1$\frac{3}{10}$ miles from Whip islet, and about half way between South Saddle island and Bit rock, has 27 feet over it at low water.

East Saddle island, separated by a pass 700 yards wide from South Saddle, is 2 miles long northwest and southeast, 300 to 1,400 yards wide; the coast is rocky and precipitous, especially on the eastern side. Its highest peak is 692 feet high, and 800 yards eastward of the summit there is a remarkable bowlder 677 feet high, which is conspicuous from northward and southward. The island is inhabited, and there is a large village and a boat harbor at its western end.

In the middle of the pass between East and South Saddle islands is a rocky patch with 12 feet over it, and northward of this there is a patch of foul ground 400 yards in length with rocks on its drying 5 to 7 feet.

The tidal stream is rapid through this pass, which should not be used for navigation; but if obliged to pass through it keep the South Saddle close aboard.

Anchorage can be obtained during northwesterly to northeasterly winds under East Saddle island in 6 to 8 fathoms, mud.

Tide ripplings are numerous and violent southward and southeastward of East Saddle island.

Childers rock, 172° 5$\frac{3}{10}$ miles from the southeastern extreme of East Saddle, is a pinnacle which dries 3 feet at low-water springs. The base of the rock is about 30 feet by 12 feet; the top is 3 feet across; it is steep-to, except on the northern side, where a narrow ledge extends 200 yards to a rock, which has 12 feet over it.

The depths around are 22 fathoms, mud; the lead gives no indication of approach to the rock; and even at half tide the sea does not break on it.

The western extreme of East Saddle island, in line with the eastern extreme of Rein island, 332°, leads about 1¼ miles east-northeastward of the rock.

Barren islets, in Lat. 30° 44′ 00″ N., Long. 123° 8′ 30″ E., are three in number and extend ¾ mile east and west; the western and largest islet is about 400 yards long, 200 yards wide, and 150 feet high; at about 1,200 yards southeastward of the eastern islet is a rock, which dries 10 feet and breaks heavily, and there is shallow water between the islet and the rock. Heavy breakers, which were reported to have been seen about 1 mile southward of the islets, were unsuccessfully searched for in 1893, and it appears probable that these breakers were on the 10-foot rock.

Coast.—From Yangtze cape to Chapu roads, a distance of about 40 miles, the coast trends southwestward, and has only been imperfectly surveyed. Off this stretch of coast the Seshan islands are located.

Seshan islands.—East Seshan, the eastern group of these islands, lies about 12 miles westward from Southwest Horn island, and is 271 feet high, with 5 islets around it. Middle Seshan island, lying 6 miles west-northwestward of East Seshan, is the largest of a straggling group consisting of itself and 8 islets extending 4½ miles northeast and southwest. House islet, 3¾ miles southwestward of Middle Seshan, is cliffy, with a house on its summit. At ¾ mile southward of House islet is a small rock nearly awash, which is the southern part of the group. Neither of these groups is sufficiently large to afford shelter, but there is fair anchorage in the vicinity of the West Seshan group, 3 islets 10½ miles west-northwestward of Middle Seshan island.

Tides.—It is high water, full and change, at the Seshan islands at 0h. 0m., approximately; springs rise 14 feet.

Fog islets, in the middle of Hangchau bay, at 16 miles west-southwestward of Middle Seshan island, are 5 low rocky islets; the depths of water about them is 5 to 6 fathoms.

Chapu is an old Chinese town, become little more than a fishing village, situated in a bight on the northern shore of Hangchau bay, 17 miles west-southwestward of West Seshan. The walled-in part of the town is now a huge green field, with perhaps a dozen houses on its southern side. It was the port of Hangchau fu, and its position may be known by the hills in its vicinity, as well as by the islets which protect the roadstead off it from the eastward. On the eastern of these islets is a remarkable white house.

The town lies at the head of a bay on the western side of the hills forming its eastern point, and at low tide the mud extends a long way from the low land lying between these and some distant hills whose tops are covered with buildings.

In proceeding to Chapu roadstead, round Holley islet, the southern of the islets, eastward of Chapu, at about ¼ mile, and haul up for the houses lying westward of the hills. The anchorage is sheltered from east-northeast, through north, to south-southwest; but the rate of the tidal streams is 5 knots at springs, and the tides rise and fall 25 feet. The mud dries ½ mile from high-water mark, is steep-to, and the lead gives no warning.

Chapu road—Shoal.—In 1904 a sounding of 2 fathoms, reduced to low-water springs, was obtained from H. B. M. S. *Rosario* in a position situated at a distance of 1,650 yards 263° from the northern extremity of Holley island.

The existence of this shoal must be considered doubtful, as it depends on one cast of the lead only, but there is no improbability of shoal water existing in this locality.

There is telegraphic communication with Shanghai.

Hangchau bay is the name of the large bay at the mouth of the Tsientang Kiang, a river which has a bore or tidal flood which is dangerous to shipping. Steamboats going to Hangchau should not start until half tide; they will then, if able to steam 4 knots with a 3-knot minimum flood stream, reach Haining before high water at that place. The best plan for ships' boats is to ground on the right bank of the river, 3 miles westward of Haining, as the junk shelters on the sea wall are hard.

The bore having passed, boats should proceed to the city as soon as they float, taking advantage of the following flood, and keeping over on the left bank of the river. The distance from the above grounding place to a safe position just eastward of Hangchau is 18 miles.

Boats drawing over 3 feet should not be used for communicating with Hangchau.

Junks take 3 days going from Chapu road to Hangchau, and shelter first in Bore shelter bay and second at Haining platform.

The return from Hangchau to Chapu road can not be safely accomplished under 3 tides in any boat. A boat should leave Hangchau immediately after the bore has passed, and secure at or opposite Haining; after the next high water, proceed to Bore shelter bay; and at the next high water after arrival there, to Chapu road.

Navigation between Bore shelter bay and Chapu road is not safe in strong winds, on account of the violent overfalls. Boats should not start at night except with a pilot.

Tide.—It is high water, full and change, at 1h. 27m.; springs rise 25 to 34 feet at Rambler island, 19 to 22 feet at the entrance of the river.

Bore of the Tsientang kiang.—At full and change of the moon the bore of the Tsientang kiang originates between 10h. 0m. and 10h. 30m. in the vicinity of the meridian of Chisan, a conspicuous hill 102° 12 miles from Haining, and on a still night it can be heard at Haining half an hour after its formation. The bore is composed of two branches; the main and higher branch keeps along the shore, touching the sea wall with its northern extreme and the sands with its southern extreme; the other branch appears at Haining from the southeastward, touching the sand on both sides. At 4 miles from Haining the branches join, the southern extreme of the first with the northern extreme of the second, making a continuous white line 2 miles in length. Shortly afterwards the bore commences to contract in width, increase in speed, and rise in height, conforming to the mouth of the river. At 2 miles from Haining the flood stream, probably that from the southeastward, which runs through the other, charges into the sea wall. There is no particular effect at the wall itself, but a violent rebound, causing a tumultuous rising of the waters in waves several hundred yards behind, and twice as high again as the front of the bore. These waves exist for many minutes, traveling southward or southwestward, and subside onto the back of the bore. Usually, as the moon crosses the meridian, the bore passes Haining, where it is nearly a straight line across the river, 1,800 yards wide, 8 to 11 feet high, and traveling 12 to 13 knots an hour, its front being a uniform sloping cascade of bubbling foam, falling forward and pounding on itself and on the river before it at an angle of between 40° and 70°. The highest and steepest part is over the deep channel of the river.

The northern end of the bore swells up to the sea wall as it passes along, but the southern end, meeting an incline of sand which only rises 19 feet in 1 4/10 miles, trails away in a tapering wall of very deliberate breakers, which terminate ½ mile in rear of the bore or where it passed 3 or 4 minutes previously. The river fills up to the level of the bore soon after it passes, but not evenly. The height, speed, and regular appearance of the front are maintained for 15 miles above Haining, after which the height decreases, and the bore passes Hangchau fu 1h. 45m., soon after which it breaks up and disappears.

A quarter of an hour after the bore has passed Haining the water has risen 13 feet; at 2h. 0m. it has risen 18 feet; it is high water at 3h. 0m. when the tide has reached a height of 19 feet, and the stream at once commences to run out swiftly. At 5h. 0m. it is at the mean level; at 8h. 0m. it is nearly low water. The outgoing stream, however, continues to run rapidly eastward until the arrival of the next bore. The water is at its lowest for the 2 hours preceding the bore.

It is high water at Hangchau fu about the same time as at Haining, but the rise and fall does not exceed 6 or 7 feet.

At Haining the flood lasts for 3 hours, the ebb for 9 hours. At Hangchau fu the flood continues for 1¼ and is nearly all in the bore.

There is no place in the river where boats can be secured in safety 2½ hours after high water. All traffic between Haining and Hangchau fu begins soon after the bore has passed and ends 2 hours after high water, a period of 3 to 4 hours.

On the right bank of the Tsientang the stream—at any rate for 5 or 6 miles inside the mouth of the river—commences to run out strongly an hour before high water at Haining.

The bore abreast Hangchau fu, if it occurs at all, is not regarded in any way dangerous for 15 or 20 days in the month. At Haining the natives state positively that it comes with every flood tide, but that in calm weather and neaps it is only 2 or 3 feet high.

The bore is probably always dangerous on account of its speed, and at springs it is most formidable. Navigation for ships is impossible.

When the moon is in perigee at full or change, or when there are strong northerly or easterly winds in the Chusan archipelago, the bore generally arrives early off Haining, travels at a greater speed than usual, and is also higher. The bores on the 8th, 9th, and 10th of October, 1892, the moon being in perigee on the 7th, and full on the 6th, were 11 to 12 feet high, and passed Haining from ½ to 1½ hours before the moon crossed the meridian, traveling at a rate of 13 to 14 knots an hour. . High water rose 22 feet, or 1½ feet from the top of the sea wall abreast the pagoda.

The Chinese expect the highest bore on the 18th day of the 8th moon, which, in 1892, was the 8th of October.

Hangchau, a most ancient city, is situated on the left bank of Tsien tang kiang, at 20 miles above its entrance, from which it is separated by a belt of clean sand about 2 miles in width, and it is certainly most important, as the capital of the rich and populous province of Chehkiang, the center of a great silk producing district and of the manufacture of the best silks, the sole source of the silk fabrics supplied to the imperial household, the southern terminous of the Grand canal, and a great center of Chinese culture and literature. The city is also remarkable for its beautiful situation, a chief feature of which is a lovely lake, named Si hu, on the west of the city, and surrounded by a picturesque range of hills. The city is inclosed by a wall faced with hewn stone about 13 miles along its perimeter, 30 to 40 feet high, 20 to 30 feet broad, and pierced by 10 large gateways. The population is estimated at 700,000; it greatly diminished during the Ta ping rebellion, but is now rapidly increasing.

Hangchau was opened as a treaty port in 1896 and the new settlements are in an excellent position on the Grand canal, 4 miles from the city wall. The Grand canal, the other end of which is at Tientsin, ends about 1 mile from the northern gate of the city, but it is extended by means of a mud slide or haulover within the walls and joins the other canals with which the country is intersected. In 1900 the lowest water in the Grand canal was 6 feet, on the 26th of August, and the highest was 11 feet 5 inches, on the 11th of April. Eastward of the Grand canal and parallel with it is another canal joining the Hangchau with Haining.

Communication.—Hangchau has no direct communication with the sea, the whole of the trade passing through Shanghai. It can be reached from Shanghai in about 24 hours by steam launch; Ningpo is distant from it at least 3 days by the inland waterways. There are, with few exceptions, 1 Chinese launch daily to and from Suchau, and 1 Chinese and 1 Japanese launch daily to and from Shanghai. Each launch takes 6 to 8 junks or passenger boats in tow.

In 1905 the population of the city was estimated to be about 350,000.

The foreign settlements are situated about 5 miles to the northward of the city and 10 miles from the river. The only means of communication with them is by means of steam launches, which navigate the canals with which the plain around Hangchau abounds.

Trade.—In 1905 the value of the imports amounted to $5,503,500, and of the exports to $7,671,715.

In the same year the number of vessels that entered the port was 2,277 steam launches with tows, and 2,335 junks, with a total aggregate tonnage of 255,467 tons. These figures do not include the inland steam navigation trade.

Coast.—The southern shore of Hangchau bay from the mouth of the Tsientang kiang trends upward of 30 miles to the eastward to Talung island.

Caution.—This stretch of coast is fronted by a dangerous mud bank which, at the distance of 8 miles from Talung, dries 7 miles off shore, and on its edge are some small knolls. A vessel touching this bank is immediately turned over by the tidal stream, which attains a rate of 6 knots at springs.

Seven Sisters islets lie about 10 miles to the northward of Talung island; although small, afford shelter from northerly winds. The channel between them and the dangerous mud bank just described is about 4 miles wide, and the depth in it is 4½ to 2 fathoms, shoaling toward the bank. A reef shows at low water, at ½ mile north-northwestward of the western islet; and a shoal of 2 to 3 fathoms extends 4 miles northwestward from it.

West Stork island lies about 2 miles farther eastward.

Nanho (South island) lies about 12 miles north-northeastward of Talung island; it is 800 yards long east and west, flat-topped, 225 feet high, and cultivated. As the water deepens close around this island to 32 fathoms, vessels can not anchor near enough to get shelter, but the holding ground is good. About ¾ of a mile northward of it is a small rock 25 feet high.

Talung island, at the southern entrance point of Tsientang estuary, or Hangchau bay, has a high bluff and the island is 920 feet high.

Friendly islets lie about 4 miles southeasterly from Talung island and ¾ mile off shore, consisting of a group of 5 islets.

Yung river, upon which is situated the city of Ningpo, rises in the high ranges of Chehkiang province and flows into the sea at about 6 miles southeastward of Friendly island. Ningpo fu stands on the left bank at 12 miles from the mouth.

The Yung separates into two branches at Ningpo fu; the northwestern is a large stream running through Yuyao and Tsie kie districts, and is variously called the Yuyao or Tsie kie branch and the Shun river; the southern or Funghwa branch is barely 200 yards wide, and is crossed by a bridge of boats at ¼ mile above the junction. As the turning at this junction, from Yung river into the Tsie kie branch, is very sharp and difficult to take, owing to the crowded state of the river and the flood stream setting up the Funghwa branch, large vessels anchor below it and wait until it is clear of the native shipping.

Clearing mark.—When approaching Yung river from the northward a good clearing mark for the eastern end of the extensive detached shoal westward of Ta ping is Citadel hill, open south of Tse le (Square island), bearing about 226°.

Caution—Depths.—Recent information shows that the depths in the entrance to the Yung river have altered so much that the admiralty chart can no longer be considered a safe guide, and the channel should be examined or local assistance obtained before entering. The channel southward of Seostris rock is no longer used.

A depth of 6 fathoms has been reported to exist to the southward of Siau yu, at a distance of 1,350 yards, 83°, from Fusan light-house.

Navigability.—The least depth in the fairway of the river between the entrance and Ningpo is 9 feet, and vessels drawing 17 feet can ascend to the city at high water ordinary springs. The water in the river is raised by northerly or northeasterly winds, and during the northeast monsoon vessels drawing 17 to 18 feet can ascend to Ningpo at neaps. In the southwest monsoon the water is generally lower.

The bar of Yung river is of mud and it extends $1\frac{3}{10}$ miles, commencing at about 400 yards southwestward of Fusan. The least depth at low tide in the fairway over the bar is 12 feet.

Vessels drawing 20 feet enter and moor off Chin hai at high water ordinary springs, and vessels drawing 15 feet at half tide.

Pilot.—There is one pilot for the Yung river, who lives at Ningpo, but can be obtained by telegraph on request being made to the harbor master. The pilot's sampan flies the usual white and red horizontal pilot flag. Pilotage is compulsory for all vessels drawing over 10 feet, excepting the coasting steamers.

Before entering the river it is advisable to communicate with the harbor master at the tide surveyor's house, who will see that the narrow part of the channel is clear of junks. When passing through, the north shore should be kept close aboard to avoid a stone pier which projects some distance from Kiang nan and has only 4 feet over its extremity at high water. Thence the navigation is easy, a mid-channel course being kept.

Chin hai, at the mouth of Yung river, is the maritime port of Ningpo.

Chin hai, an old city, surrounded by a massive high wall, is on the left bank, with large suburbs on both sides of the river, the entire population being about 26,000. A sloping wall of masonry protects the city and the flat country to the westward from the inroads of the sea. A noticeable feature is Citadel hill, over the promontory northeastward of the city, upon which there was once a citadel, but which is now surmounted by two large joss houses 291 feet above the sea.

The only building in or near Chin hai which is of use for bearings is the house of the tide surveyor, on the left bank of the river, near the inner end of the bar. This customs official attends to the lights, buoys, and beacons, and maintains a clear passage morning and evening for the daily steamer.

Kin ki hill, upon the summit of which there is a large stone-built beacon with staff in the middle, 329 feet above the sea, is on the opposite side of the river to the city. In the river, under Kin ki hill, and almost connected with the point at low water, there is a small island on which is Sei yuen fort.

The country for many miles westward of Chin hai is flat, but on the southern side of the river it is mountainous. A long range of hills stretches from Chang tu point to Mount Union; and a lower range trends south-southwestward from Kin ki hill. Between these ranges there is a navigable creek and canal, entering the sea under Wang yuen fort, which is placed in a commanding position under Lookout hill, and defends the approaches to the bar.

Wang Yuen fort, on the point at the foot of Lookout hill, is now the saluting fort.

Telegraph.—Chin hai has telegraphic communication with the universal telegraph system.

Tides and tidal streams.—It is high water, full and change, at the pier of the tide surveyor's house, Chin hai, at 0h. 14m.; springs rise 11 feet, neaps 8¾ feet; neaps range 3 to 5 feet. The height of the water is much affected by the direction and strength of the wind, a strong northerly or northeasterly wind raising the tide 1 foot 6 inches higher than usual.

The top of the wall above the upper step at the inner end of the pier is 9 feet 5 inches above the mean river level for the month of November.

Anchorage.—There is anchorage off Chin hai in the middle of the stream, with the tide surveyor's house bearing 313°, distant 300 yards, in 5 fathoms, mud. It is necessary to moor. Lower booms must be rigged in from sunset to sunrise.

The navigable portion of the river just above this is only 200 yards broad and is crowded with junks.

Ningpo fu.—The Chinese city is immediately above the junction of the Yuyao and Funghwa, its walls extending along the sides of both branches. It is governed by a tao tai, who is also superintendent of native customs. Its population of 240,000 are industrious, enterprising, intelligent, and mild in disposition.

The British consulate is situated on the left bank of the main river, about ¾ mile below the junction. It is a conspicuous red building.

There is a small English church on the Bund, also one belonging to the Wesleyan Methodist Mission. At the south end of the foreign settlement is a Roman Catholic cathedral with a very conspicuous clock tower.

The harbor master's house is situated about 500 yards southwestward of the custom-house.

There are two pontoons off the foreign settlement, the lower belonging to the China Navigation Company and the upper to the China Merchants Company.

A red light is exhibited on the shore abreast the lower end of the former pontoon.

A bridge of boats connects the foreign settlements with the city of Ning po.

The usual anchorage for ships-of-war is near the left bank of the river abreast the British consulate, in a depth of 4 fathoms.

It is high water, full and change, at Ningpo fu at 1h. 0m.; springs rise 9 feet.

The rate of the tidal streams is 1 to 3 knots, according to the age of the moon and the time of tide. The flood stream commences to run into the river 4 hours before high water on the shore, and the ebb stream commences to run out 1½ hours after high water.

Tidal streams.—After heavy rains up-country, the ebb often runs out of the river for 11 or 12 hours, and vessels do not swing to the flood at all. This does not appreciably affect the time of high water.

Trade.—In 1905, the foreign imports at Ning po were valued at $7,496,025, and the exports at $4,626,625.

In the same year 644 vessels, with an aggregate tonnage of 523,427 tons, entered the port. This total does not include the inland steam navigation or the junk trade.

The climate of Ning po is similar to that of Shanghai. It is more healthy, owing probably to the water in the river being salt instead of fresh, and less favorable to malarial exhalations. Its advantage over Shanghai as a place of residence for Europeans is its proximity to the sea and the vicinity of hilly regions with pure air and moderate temperature.

From July to August, 1900, the thermometer stood almost constantly at from 92° to 101° F. in the shade.

Supplies.—Meat, vegetables, and bread can be obtained, and also water of fair quality, which is procured from two wells, each of which produces 17,000 gallons daily. Native shops established in various parts of the settlement supply foreigners with provisions at prices more moderate than at Shanghai. Game is plentiful during the winter, and fish, including mackerel, are to be obtained of superior quality, and in abundance.

Coal.—A firm at Ningpo imports about 4,500 tons of native and Japanese coal annually, and it is sent off to vessels requiring it in lighters. There is, however, no fixed amount kept in stock, and dependence should not be placed on obtaining a supply.

Fu san (Tiger island) lies about 1 mile northeastward of the mouth of the Yung river, is a precipitous rock 150 yards across, rugged, dark, and 110 feet high.

There is landing, in fine weather, on the southern side of the island at the foot of the steep steps which lead up to the lighthouse, and in southwesterly winds in a crack between the rocks on its northern side.

Light.—An octagonal light-house, 30 feet high and painted red and white in vertical stripes, on the summit of Fu san, exhibits at 140 feet above high water, a fixed red light visible 5 miles.

The keepers' dwellings are painted red and white in vertical stripes.

Fog signal.—A gong is sounded 5 times in quick succession at intervals of about 1 minute.

Position.—Fu san light-house is in Lat. 29° 58′ 19″ N., Long. 121° 43′ 51″ E.

Tiger's tail rocks are three black rocks 200 yards northwestward of Fu san; the highest dries 6 feet above low water springs, and the northern rock dries 5 feet, and is marked by a black tripod beacon surmounted by a white cage.

Tiger's paw shoal is a mud spit extending 350 yards eastward of Fu san. The general depth over it is 14 to 17 feet; but there is a knoll at its end with 11 feet water over it, from which Fu san light-house bears 263°, 400 yards.

Sesostris rock lies 84° 400 yards from Fu san light-house and nearly in mid-channel, is a pinnacle with 8 feet over it. A checkered black and red buoy, surmounted by a black cage, is moored northward of and near the rock.

Vessels drawing over 6 feet should not pass between Fu san and Chung point.

Sesostris rock buoy is marked " Ningpo " in white letters.

Siau yu lies about 1 mile and 200 yards east-northeastward of Fu san; is 400 yards long east and west, 100 yards wide, and 100 feet high. On its northern side an extensive bank of mud dries out about 350 yards.

The channel between Fu san and Siau yu may be used by vessels of 12 feet draft and under. It is often used by the river steamers, but there is no advantage in taking it.

Ta yu san lies 100 yards to the eastward of Siau yu, and is the higher. It is almost divided into two parts near the center, and there is a hill 124 feet high near the southern end. The eastern point of this island juts out in a long rocky ledge, of which portions are awash at high water.

Nemesis rock, 45° 200 yards from the eastern extreme of Ta yu san, dries 2 feet at low water springs, and it is marked by a spar beacon painted red, surmounted by a cage.

Nemesis rock beacon was missing in October, 1904.

Tse le (Square island), 352° 1½ miles from Chang tu point, is 300 yards long northeast and southwest, 100 yards wide, 90 feet high, bold, rocky, of a dark color, steep-to around, and precipitous on its eastern side.

Lights.—An intermittent white light every 10 seconds, thus: Light, 8 seconds; eclipse, 2 seconds; is exhibited from a white octagonal light-house, 33 feet high, at the northeastern end of the summit of Square island, at 120 feet above high water, and visible 10 miles.

The keeper's dwelling is painted white, and there is a flagstaff at 90 yards southwestward of the light-house.

Fog signal.—A bell is sounded once every 15 seconds.

Middle ground.—The southeastern end, or tail, of the long bank known hitherto as the Middle ground, is situated 2¾ miles northeast of Tse le. This bank has, in some places, as little as 9 feet over it. Tse le light-house in line with Tiger Island light-house, bearing 220°, leads over the tail of the bank in 14 feet, sand.

Penguin shoal, the northern end of which lies, 149°, 1,000 yards from Tse le light-house, extends thence within the depth of 3 fathoms, southward 300 yards with a width of 150 yards. The bank is mud, and its shallowest spot has 16 feet over it.

Chang tu point.—A small rocky promontory juts out from the mainland at about 4 miles eastward of the mouth of the Yung river, the bay between being filled with mud; at 400 yards northwestward of the promontory is a rock with less than 6 feet water over it. Chang tu point, ½ mile eastward of the promontory, is a black rocky cape; 600 yards eastward of it there is a rock 11 feet high, and two rocks close together, each awash at half tide, bear 83° 350 yards from the point.

Islands.—The northern islands of the Chusan archipelago will now be treated of, commencing with Tsu san and outlying islands and rocks and continuing in sequence to the southward.

Tsu san is 9 miles long, west-northwesterly and east-southeasterly, 1 to 3½ miles broad, and its highest peak, at the southwestern end of the island, is 1,054 feet high; on this summit there is a joss house surrounded by a wall.

The plains of Tsu san are richly cultivated, and there is a large population, principally inhabiting the western part of the island, where there are numerous villages, and a Chinese official. The peasants are an unusually amiable race, and friendly.

The numerous bays around Tsu san are full of mud and afford no harbor for shipping; but there is anchorage in moderate depths off almost any part of the island and shelter can be obtained from any wind; do not, however, bring up in a scour—that is, in the deep water in the vicinity of rocky points—as tide ripplings strain the cables and in strong winds are dangerous.

Anchorage westward of Pennell point, the southwestern point of the island, is not recommended, as the tidal stream near the point occasionally attains a rate of 5 to 6 knots.

Croker point is the eastern termination of the northern part of a conspicuous promontory which juts out about 1½ miles from the middle of the north coast of Tsu san.

Parry island lies 63° 1¾ miles from Croker point; is small, rocky, and barren, steep on its eastern side and 228 feet high.

A small rock, awash at high water, lies 100 yards eastward of Parry island.

Simpson islands are 2 in number; the larger, about a quarter of a mile northward of the northern extreme of Croker promontory, is 1,200 yards long east and west, 500 yards wide, and 265 feet high. In the passage between this island and the promontory there is a rock which dries 8 feet, and the tidal streams are very rapid.

Two rocks lie off the northern point of the larger Simpson island and dry 5 feet; the outer is 300 yards distant. There is also a rock above water at 200 yards off the eastern point of the island.

Between Parry and the larger Simpson island the soundings are irregular, and a rock lies midway, with the sharp summit of Parry island bearing 95° distant 1 mile, which has 12 feet over it.

The smaller Simpson island, 1½ miles northwestward of Croker promontory, is about 600 yards long east and west, 200 yards wide, and 110 feet high. A small rock, 1 foot high, with a ledge extending under water northward from it for several yards, and which has a depth of 4 feet over it at the outer end, lies 200 yards northward of the island; and a pinnacle, with 4 feet over it, lies 300 yards eastward of the island.

Rowe rock lies 6°, 300 yards from the summit of the larger Simpson island, is a pinnacle with 2 feet over it.

Beal island, rather over 1 mile northwestward of the Simpson islands, is about 1½ miles long and 400 yards to 1¼ miles broad, 524 feet high, and covered with grass. It is inhabited.

Elvy rock, 3 feet high, lies with the southeastern extreme of Beal island bearing 218° distant 1,000 yards.

Bassett island, 2¼ miles westward of Beal island, is about 1,600 yards to 1 mile across, 653 feet high, and covered with grass and stones; there are three sharp points on its eastern side. It is inhabited. Shoal water extends about 1,600 yards westward of the island.

Smith islands, between Beal and Bassett islands and about ½ mile from the latter, are small, 2 in number, and the largest is 127 feet high. Fishing nets are numerous between Beal and Smith islands.

Dawson islands, a group of 9 islands with several islets and rocks, lie southward of Beal, Smith, and Bassett islands, the channel between having a least width of about 1,200 yards. Henry island, the largest and highest of the group, is 1¼ miles long west-northwest and east-southeast, a few yards to 400 yards wide, and has a well-defined conical summit 192 feet high. The islands are uninhabited.

A rock with 6 feet water over it lies 70°, 350 yards from the eastern point of the eastern Dawson island; and a rock with 6 feet water over it lies nearly in the fairway with the summit of Henry island bearing 101°, distant 1½ miles.

Paymaster passage, between Dawson islands and Tsu san, has a least width of 700 yards, and is 3 to 17 fathoms deep. The tidal streams in this passage, and also among the Dawson islands, are rapid. There is good anchorage in smooth water and moderate depth 1 to 2 miles southwestward of Simpson islands, sheltered except from winds between north and northeast.

The western approach to Paymaster passage is somewhat shallow, but vessels of 15 feet and less draft use it.

A cluster of rocks, some above water, some sunken, and some drying, lies within about half a mile of the coast of Tsu san at 3¼ miles westward of the northern extreme of Croker promontory. The most remarkable is a black sugar-loaf rock 56 feet high.

McCauley islet lies 247°, 2 miles from Hay point, the northwestern extreme of Tsu san, is small in extent, 102 feet high, and nearly divided into two. A rocky islet about 30 feet high is situated a few yards northwestward of it.

Evans islets, situated off the coast of Tsu san at about 330°, 1,800 yards from Pennell point, are a group of 3 islets close together, the largest being 126 feet high.

There are no known sunken rocks of importance off the south coast of Tsu san, but a rock with 2 feet over it lies 400 yards offshore, and with the joss house on the summit bearing 288°, distant 2¾ miles.

Balfour islands are a group of six islands, with some islets and rocks, lying eastward of Tsu san. Andrew island, the largest, is 1½ miles long north-northeast and south-southwest, of irregular shape, 548 feet high, and of a light color.

A large fishing village is situated on the shore of Worth harbor, the shallow bay on the southwestern side of Andrew island, and at certain seasons boats are numerous, as many as 1,200 being in sight at one time from the anchorage.

There is good anchorage in moderate depths, sheltered from east, through north, to northwest, with the western extreme of Andrew island bearing 333°, distant ¾ mile, and also in a moderate depth southeastward of Francis island, the southern island of the group, sheltered from northerly winds.

Balfour passage, between Tsu san and Balfour islands, has depths of 7 to 24 fathoms. Off the western point of Andrew island the navigable passage is contracted to 700 yards in width by Worth rock, a small pinnacle 2 feet high, with a rock which dries 2 feet at low water, 60 yards westward of it, on the western side of the passage, and by a pinnacle, with 6 feet over it, at 91°, 800 yards from Worth rock and 300 yards from the western point of Andrew island, on the eastern side of the passage.

In navigating Balfour passage, keep Worth rock close aboard.

Hobson islands are three small rocky islands northwestward of Balfour islands. Elgar, the eastern island, is 196 feet high, and a ledge of rocks, the outer of which is 7 feet high, extends 150 yards eastward of it. A rock 4 feet high lies 400 yards westward of the western Hobson island.

The passage between Balfour and Hobson islands is about 1,800 yards wide and deep; no shoals were found in it, and it is occasionally used by steam vessels, but the route eastward of Elgar island is recommended.

Beehive lies 101°, about 10 miles, from the easternmost of the Balfour islands in Lat. 30° 22′ 20″ N., Long. 122° 41′ E., is a black, rugged rock, 46 feet high; a flat-topped rock, which uncovers 7 feet at low water, lies 300 yards east-southeastward of the Beehive, and a sunken pinnacle with 9 feet over it 338°, 700 yards from it.

Lu Kon islands are a group of three islands, the southwestern of which is in Lat. 30° 25′ 45″ N., Long. 122° 55′ 30″ E., or 75°, about 13 miles from the Beehive, and is about ¼ mile long, 200 yards wide, and 313 feet high.

The middle island, 300 yards northwestward of the southwestern island, is about ½ mile long north and south, 100 to 800 yards wide, and 286 feet high. The northeastern island, close eastward of the middle island, is about 400 yards wide and 243 feet high. The islands are barren, and precipitous on the eastern side; rocks extend about 400 yards off them in places, outside which the water around is deep. Between the middle and southwestern islands are two rocks 99 and 66 feet high, respectively.

None of the islands are inhabited, but fishermen build temporary huts on the largest during the fishing season.

Volcano islands are a group of about 12 islands.

Uan san is 3½ miles long, north-northeast and south-southwest, 200 yards to 1 mile broad, and rises to a ridge on which are several well-defined peaks, the highest of which is 492 feet high. It is inhabited.

A mud bank with 4 to 13 feet over it stretches from its eastern coast nearly to Becher islet. On its western side Uan san is connected with Shio chi san by a bank which is mostly dry at low water and has only 7 feet over its deepest part.

Shio chi san, 1¼ miles westward of Uan san, is 1,600 yards long, 300 to 1,000 yards broad, and has one hill in the center, 411 feet high. Northward of it and connected by a bank is an islet 190 feet high. From this islet a group of islets and rocks, with shoal water, extends 300°, 2¼ miles. The northwestern islet, which has deep water westward of it, is 149 feet high.

At 345°, 1¾ miles from the eastern end of the islet northward of Shio chi san, is an islet 116 feet high, ½ mile northward of which is a rock 8 feet high.

A rock, 21 feet high, lies 171°, 1⅒ miles from the southern point of Shio chi san.

West Volcano island, situated 302°, nearly 4 miles, from Shio chi san, is a black rock 200 yards long, 100 yards wide, 63 feet high, and split into two, the northern part being very small

Two rocks close together, which dry 4 feet at low water springs, are situated about 200 yards southward of West Volcano island, and another rock, which dries 2 feet, lies 300 yards southward of the island.

Lights.—A group of intermittent white lights, showing two eclipses every 20 seconds—thus, light, 13 seconds; eclipse, 2 seconds; light, 3 seconds; eclipse, 2 seconds—and visible 15 miles, is exhibited from a circular black light-house, 33 feet high, on the summit of West Volcano island and 93 feet above high water.

The keeper's dwelling is painted white.

The light-house is in Lat. 30° 20′ 50″ N.; Long. 121° 51′ 25″ E.

Fog signal.—In answer to a vessel's fog signal two guns are fired with an interval of 5 minutes between them, and if the vessel's fog signal continues to be heard, the firing is repeated after an interval of 10 minutes.

Tides.—It is high water, full and change, at West Volcano island at 0h. 19m.; springs rise 12 feet, neaps 8 feet 6 inches; neaps range 5 feet 6 inches. The highest tides occur 2 days after full and new moon. A range of 13 feet has been observed when new moon corresponded with perigee.

Lake rock lies 54°, 700 yards, from West Volcano island, is a patch with two pinnacles on it 50 yards apart; the southeastern pinnacle has 3 feet over it, the northwestern 12 feet.

Howlin rock lies 213° 1,160 yards from West Volcano island, is a pinnacle with 9 feet over it, and 7 to 8 fathoms, mud around. Nothing in the appearance of the surrounding water indicates foul ground.

A group of rocks, the highest of which is 38 feet high, lies about 1 mile south-southeastward of West Volcano island.

Dumb bell islet lies 4 miles east-northeastward of Uan san, is 100 yards long, a few yards broad, and 45 feet high. There is a rock with 5 feet water over it 100 yards southward of the islet.

Skead islands lie 37°, 2¼ miles, from Dumb bell islet, are two small islands close together, the higher of which is 141 feet high.

Mariner rocks lie 352°, 2¾ miles, from the Skead islands, are two rocky pinnacles about 250 yards apart, east-southeast and west-northwest, with a least depth of 5 feet and 3 feet on them, respectively.

Tai shan island, about 5 miles eastward of the Volcano islands, is 8½ miles long east and west, while, from the northern cape, near Castle rock, to the southern cape, within Pu islet, it is 6½ miles wide. It is broken into two portions which are both hilly, but connected only at low water, the highest peak, which is ill-defined, being near the southeastern end and 822 feet in height.

Ya do dong island, ½ mile westward of Tai shan, is divided into three parts at high water; it is about 1$\frac{2}{10}$ miles across and its summit is 514 feet high. There are several quarries on the island. At about 400 yards westward of the southern part of Ya do dong is a rock which dries 6 feet.

Near Ya do dong there are several smaller islands and rocks, for which see the chart.

Drew rock lies 203° 1½ miles from the summit of Ya do dong, is a pinnacle with 2 feet water over it, and 5 to 6 fathoms mud, close around. Except with very smooth water and in the strength of the stream, the rock is not indicated in any way.

Kestrel rock, 238°, 1$\frac{4}{10}$ miles from the summit of Ya do dong, dries 3 feet at low-water springs.

Becher islets, two in number, 243° 1$\frac{1}{10}$ miles from Ya do dong, are 136 and 152 feet high; shoal water extends about 400 yards northwest and southeast from the eastern and larger islet.

At about 346°, 1$\frac{1}{10}$ and 1$\frac{4}{10}$ miles from the Becher islets, are two rocks 24 and 91 feet high.

Ya do dong pass.—Between Ya do dong and Tai shan there is a good passage 1¼ miles long and 800 yards wide, with a depth of 7 to 24 fathoms, the deepest water being in the north end. The passage is close eastward of Ya do dong, as a spit of mud extends from Tai shan opposite the northern point of Ya do dong for a distance of ½ mile.

There is a navigable passage with a depth of about 5 fathoms between Ya do dong and Becher islets.

There is also a navigable passage between Tai shan and Hughes islands, which are situated off its northwest coast.

Anchorage in moderate depth, sheltered from easterly, through south, to southwesterly winds, can be obtained on the north coast of Tai shan at 1 to 2 miles southwestward of Castle rock.

Tidal streams.—The southwest-going stream begins in Ya do dong pass at 2½ hours before high water, and the northeast-going stream 2½ hours after high water. The rate of the streams is 3 to 4 knots at springs.

Castle rock, the outer of half a dozen islets extending about 1 2/10 miles north-northwestward from the northern cape of Tai shan, is very remarkable, precipitous on the north, and 204 feet high; on easterly or westerly bearings, the summit has the appearance of being surmounted by a castle.

There is a deep hole off Castle rock, 2 to 3 miles across, with 20 to 30 fathoms in the middle. In the locality the rate of the tidal streams is 4 to 6 knots at springs, causing whirls and eddies.

Primmer rock, 96°, 1 2/10 miles from Castle rock, has a depth of 5 feet over it, and it is generally indicated by chow chow water. Dumb bell islet, open northward of Castle rock, leads about 200 yards northward of the Primmer, and the highest peak of Chang tau major open eastward of Devils rock leads over 200 yards northeastward of it.

Devils rock, 200 yards off the northeastern point of Tai shan, is black, conical, and 63 feet high.

Gansu and Maxwell islands are situated at the northern mouth of Tai shan channel, between the eastern point of Tai shan and the northwestern point of Chang tau minor. Gansu rises to a well defined summit 212 feet high, Maxwell island is 117 feet high.

A rock lies about 150 yards eastward of the eastern point of Maxwell island and another at 300 yards northward of the point, over both of which there is a depth of 12 feet.

Singleton spit is a bank of black sand stretching northeast of Gansu island; at its end with Gansu summit bearing 234°, distant 1 mile, there is a depth of 23 feet.

The general direction of the eastern coast of Tai shan is north and south, but it is deeply indented by bays which are full of mud.

Pu, Ta pu ma, and Ya pu ma, 3 islets off the southern cape of Tai shan, are rocky, precipitous, and covered with grass; the channels between them are navigable only by boats. There are 3 islets, 35, 80, and 90 feet high, within 400 yards southward and southwestward of Pu.

Tai shan channel, between Chang tau and Tai shan, is 4 miles long, 1,400 yards to 1 2/10 miles broad, with a depth in the fairway of 11 to 39 fathoms, mud. The northern end of the channel, between Gansu and Maxwell islands and the bank of mud southward of them, on the one hand, and Mitchell rock on the other, is narrowed to 1,400 yards; and off the southwestern point of Chang tau minor the channel is narrowed to 1,500 yards by Baylis rock.

The rate of the tidal streams in the channel is 5 knots at springs, the flood being the north-going stream and the ebb the south-going. This channel therefore requires care in pilotage, but it is useful for steam vessels and leads to Chang tau harbor.

Kui san island, about 1 mile southward of Tai shan, is $1\frac{1}{2}$ miles long, northwest and southeast, $1\frac{3}{10}$ miles broad, and has a conspicuous dome-shaped summit 628 feet high.

Su shan island, 1 mile southward of Kui san island, is $3\frac{7}{10}$ miles long north and south and $3\frac{4}{10}$ miles broad at its northern end; it is hilly and its highest peak is 676 feet high. A mud flat and shoal, with less than 3 fathoms water, extends northwestward from Su shan to a position at 188° $1\frac{3}{10}$ miles from the southwestern point of To go san. There are several islands and islets around Su shan, the Harty islets being 300 yards off its eastern end and connected by a mud flat; shoal water extends $2\frac{1}{4}$ miles southeastward of Su shan.

Collinson island, nearly 600 yards eastward of Kui san, is $\frac{1}{2}$ mile long northwest and southeast, 300 yards wide, and 153 feet high. An islet, 72 feet high, lies off its northern end, to which it is connected by rocks.

Gummer rock is situated 400 yards eastward of the northeastern point of Kui san, and nearly in the middle of the eastern end of Kau ding pass. It is a pinnacle with 2 feet over it, and 22 to 40 fathoms, mud, close around. The rock is not indicated in any way by the tide ripplings, nor does the sea break on it.

Bujega rock, situated equidistant from Shio Go san and Kui san, near the western end of Kau ding pass, and east 880 yards from the summit of Shio Go san, has 21 feet over it.

Shio Go san, 1,200 yards northwestward of Kui san, is an islet about 300 yards in extent and 110 feet high. At 800 yards northeastward of Shio Go san is a group of 3 rocks extending east-northeastward 800 yards, and at 200 yards southward of the middle of these rocks is a rock 8 feet high.

Shio kui san, 188 feet high, is 600 yards northwestward of Shio Go san, and To chisan, 137 feet high, is $\frac{1}{2}$ mile farther westward. A rock, 28 feet high, with a shoal on its western side, lies 350 yards southward of To chisan.

To go san, an island $1\frac{3}{10}$ miles westward of Kui san, is $1\frac{4}{10}$ miles long northeast and southwest, narrow, and its southern part is 344 feet high. A mud flat and shoal extend about $1\frac{3}{4}$ miles northwestward of the island, and near the outer end of the shoal are the Read islets, 86 and 101 feet high. At 600 yards southward of the Read islets is an islet 168 feet high, with shoal water northwestward and southeastward of it.

Shio hui pei, an islet 64 feet high, with shoal water for 400 yards westward of it, lies 308° 1½ miles from Read islets.

Hui pei, an islet 90 feet high, with shoal water for 300 yards around, except on its western side, lies 278° 1½ miles from Shio hui pei.

Cluster islands, a group of 2 islands and some rocks, lie nearly midway between the Read islets and Chang pei. A rocky patch of 4 fathoms, surrounded by deep water, lies 30° 800 yards from the northeastern Cluster island.

Chang pei island, 4$\frac{3}{10}$ miles westward of Su shan, is 2$\frac{7}{10}$ miles long, 1$\frac{8}{10}$ miles wide, and is hilly; its highest peak is well defined and 812 feet high. There are several villages on the island. The channel southward of Chang pei is about ½ mile wide, but there are some rocks with 19 and 25 feet water over them in it, and the tidal streams are strong with swirls. Two rocks lie northwestward of the island, the outer 45 feet high, being 1,200 yards offshore.

Kau ding pass, between Tai shan and Kui san, derives its name from Kau ding town, on the southern coast of Tai shan; it is navigable for full-powered steam vessels.

The width of the passage between Gummer rock and Kui san is 300 yards, the depth in mid-channel 39 fathoms, mud; and the rate of the tidal streams is 3 to 8 knots, according to the age of the moon and the time of the tide.

The channel between Bujega rock and Kui san is 540 yards wide, and there are 15 to 24 fathoms, mud, in the middle.

There is always chow chow water in the pass.

In navigating the pass keep the coast of Kui san aboard throughout.

Kui san pass, between Kui san and the islets and rocks northward of Su shan, is much superior to Kau ding pass and is navigable by full-powered steam vessels. Its least width, abreast Hamlyn rocks, is 600 yards and the depth 19 to 48 fathoms.

Mo un islands, 2 in number, lie ½ mile northward of the Harty islets, and are 114 and 162 feet high; a reef extends 300 yards from the northwestern point of the western island. A rock with 2 feet over it lies 310° 180 yards from the southwestern point of Mo un island.

Herald islets are three rocks situated nearly 1 mile westward of the Mo un islands; the highest is 72 feet high. Hamlyn rocks are a group of pinnacles northward and northwestward of Herald islets; two rocks near the channel lie 540 yards apart. The eastern rock is 1 foot high, and a rock covered with 9 feet water lies about 200 yards northward of it. The western rock dries 3 feet at low-water springs.

Several rocks lie off the northwestern coast of Su shan.

The rate of the tidal streams is 3 to 8 knots, according to the age of the moon and the time of the tide, and there are strong eddies and whirls.

Kwei channel, southward of Su shan, is not superior to Kui shan pass. On the northern side of the channel are the Grain islets, Molyneux rock, on which there is a depth of 12 feet, and three islets extending about 1$\frac{4}{10}$ miles westward off the western point of Su shan; whilst on the southern side is a chain of islets and rocks extending northwestward from Kanlan point. In the narrowest part, off Kanlan point, the channel is only 800 yards wide and the tidal streams in it are very rapid.

The direct distance from Kanlan point to the northwestern cape of Chusan is 10 miles; the coast is deeply indented and well cultivated.

Tidal streams.—In Kau ding and Kui san passes, and Kwei channel the westgoing stream begins about 3 hours before high water, and the eastgoing stream begins about 3 hours after high water.

Maum shan island, 1,200 yards northwestward of the northwestern cape of Chusan and joined to it by a mud flat dry at low-water springs, is 2½ miles long north and south, 2$\frac{1}{10}$ miles wide, and rises to a well-defined summit 987 feet high. There is a scattered population.

Crack island, 1,600 yards northwestward of the northwestern point of Maum shan, is 800 yards long, 100 to 400 yards wide, rocky, and 159 feet high. There is a rocky islet, 46 feet high, off its northern end joined to it at low tide.

Between Crack island and Maum shan there is a deep channel, narrowed to 800 yards by a spit of mud, which extends northwestward from Maum shan.

Dunsterville islands are a group of one island and four islets situated 4 miles northwestward of Maum shan. The island is 1,200 yards long northeast and southwest, 200 yards wide, and 147 feet high.

Shallow mud banks stretch ½ mile southeastward and 600 yards northwestward of the island, and a pinnacle rock, with 18 feet over it, lies 279° 800 yards from its summit.

The tidal streams past Dunsterville islands are rapid, the flood setting westward, the ebb eastward.

The summit of Dunsterville island is in Lat. 30° 13′ 01″ N. and Long. 121° 53′ 07″ E.

Chang tau consists of the two islands, Chang tau major and Chang tau minor. The strait which divides them forms an excellent harbor, secure in typhoons, and not difficult of access to steam vessels.

The highest peak of Chang tau is on the smaller island, and is in Lat. 30° 15′ 46″ N., Long. 122° 15′ 38″ E.

Chang tau major is about 7½ miles long east and west, and from 400 yards to 3 miles broad. Its highest peak is near the middle and is 940 feet high. Wasp island, off its northern coast, is 1,900 yards long east and west, 200 to 500 yards wide, and 233 feet high; and the Hornets rocks, a reef 600 yards long northeast and southwest, and drying 8 to 10 feet, lie 1,600 yards to a mile westward of Wasp island.

There are several islets and rocks off the southern and the southwestern coasts of Chang tau major, and good anchorage may be obtained in 3 to 6 fathoms, mud, northeastward of Ing longa, sheltered from west, through north, to east-northeast.

Peaked rock, Ing longa, 164° from the highest peak of Chang tau major and 1,200 yards off the southern coast of that island, is a pyramidal shaped islet 94 feet high.

Grass island, $\frac{3}{4}$ mile westward of Ing longa and the largest of the islands on the southern side of Chang tau, is $\frac{1}{2}$ mile across and 349 feet high; being close to Chang tau and much the same color, it seldom shows as a separate island.

Brenan rock, 29°, $1\frac{7}{10}$ miles from Kau pei and about 1,800 yards southward of Grass island, is a pinnacle with 12 feet over it and 12 to 17 fathoms, mud, close around. The sea never breaks on the rocks, nor is it indicated in any way.

Black rocks.—An islet, 137 feet high, lies 540 yards southward of the southwestern point of Chang tau major, and the Black rocks, 13 in number, extend about 166°, $\frac{1}{2}$ mile, from the islet. The highest and largest rock is 200 yards northeastward of the southern of the group and is 29 feet high; there are three rocks outside it which are covered at high water springs.

Yua san, 400 yards off the southwestern point of Chang tau major, is 1,200 yards long, 60 to 400 yards wide, and has a well-defined summit 291 feet high. Yua san spit is a sand bank extending about 6 cables northwestward of the island. There is a boat channel between Yua san and the main island.

Chua bek san, a precipitous islet, 109 feet high, lies southward of Yua san; it has a curious slit in it, open on northwesterly and southeasterly bearings. Westward of the southern point of this islet there is a rock which uncovers at half tide.

Fuller rock, 264°, 1,100 yards, from the highest Black rock, has 7 feet over it.

Chang tau minor is $3\frac{2}{10}$ miles long east and west, 600 yards to 2 miles broad, and rises to a bold, well-defined summit, 976 feet high, in the northwestern part of the island. It is well populated, several villages being situated on its southern side.

Baylis rock, 500 yards westward of the southwestern point of Chang tau minor, has 4 feet over it.

Mitchell rock, 400 yards westward of the northwestern point of Chang tau minor, has 4 feet over it.

Kau pei (Doub rock), 0°, 5 miles from Mei yun, is a double rock, with sufficient space between the two parts at high water to allow of the passage of a small boat; it is covered with grass on the top, and is 76 feet high.

Shio kau pei, 800 yards west-northwestward of Kau pei, is 28 feet high, and has a crack down the center, which is conspicuous on southeasterly and northwesterly bearings. At 300 yards eastward of this rock there is a pinnacle rock with 18 feet over it.

The tidal streams around the Kau pei rocks are rapid and variable; sailing vessels or vessels of small steam power should not approach them within 1,000 yards.

Ryrie rock, 280°, $1\frac{4}{10}$ miles from Shio kau kei, is a pinnacle with 21 feet over it; around the rock there are depths of 11 to 13 fathoms, mud, and the rock is not indicated in any way.

Mung du san, a rocky, precipitous islet, 291°, $2\frac{3}{4}$ miles from Shio kau pei, is 440 yards long, 400 yards broad, and has an ill-defined summit 111 feet high. Its eastern side is cliffy; a patch of rock, the outer end of which dries 10 feet at low-water springs, stretches 150 yards from its northeastern point, and foul ground connects the islet with Ta chio rock, which lies 500 yards southeastward, and is 300 yards long north and south, broken, barren, and 40 feet high.

Ryder rock, 760 yards east of Ta chio, is a pinnacle, with 5 feet over it, and a rock with 9 feet over it lies between.

Chuma kat chi, an islet 86 feet high, surrounded for about 200 yards by rocks and foul ground except on its southeastern side, lies 1,300 yards west-northwestward of Mung du san.

Chang tau harbor is the strait between Chang tau major and Chang tau minor; it is an excellent refuge in typhoons, and the best in the Yangtze kiang approach. The harbor is $2\frac{1}{2}$ miles long, 300 to 600 yards wide, and 3 to 15 fathoms in depth, completely landlocked, and affording accommodation in the depth of 5 to 6 fathoms for about 20 vessels at single anchor. The best anchorage is in the middle of the harbor, where the navigable channel is 450 yards in breadth.

In typhoons moor with 40 to 50 fathoms on each cable up and down stream, as the tidal streams cause a single anchor to become foul. The sides of the harbor being of mud and steep-to, no damage happens to a vessel, even if the cable parts, an event unlikely to occur.

No swell is felt in the harbor, but on the approach of a typhoon and during its continuance the easterly swell curls round Chua bek san and breaks on Yua san spit.

Navigability.—This harbor is available for vessels of 24 feet draft. Vessels of 16 feet draft, and moderately short, can enter at either mouth; but large ships must enter from Tai shan channel, as the eastern mouth has a sharp turn which makes it difficult to handle large vessels in the strong tidal streams.

Tides and tidal streams.—It is high water, full and change, at the western entrance of Chang tau harbor at 10h. 14m.; springs rise 12 feet, neaps 9 feet; neaps range 4 ft. 4 in. The highest tide occurs 2 days after full and change of the moon.

The tidal streams run in the direction of the harbor at a rate of 2 to 3 knots at springs, but in the western entrance the streams attain a rate of 5 knots at springs. The east-going stream begins about 3 hours before high water, and the west-going stream about 3 hours after high water.

Directions.—Small vessels can enter or leave Chang tau harbor by both entrances at any time of tide, but vessels of and over 200 feet in length should do so at slack water.

From Tai shan channel.—Leave the Fung shui rocks 100 to 200 yards to the southeastward, steering 48°, and bring the northern extreme of Fung shui rocks in line with the southern extreme of Ya pu ma, bearing 226°, to clear Yua san spit. Leave the rocky point, which is 1,400 yards northeastward of Fung shui rocks, 150 yards to the northwestward, then keep along the southern coast of Chang tau minor, which is mud and steep-to, until past the rock drying 10 feet off the northwestern part of the western end of Chang tau major, when sheer into midchannel and anchor before coming to the fishing stakes and nets, which are abreast a joss house on Chang tau major, toward the eastern end of the harbor. The navigable channel abreast Fung shui rocks is about 300 yards wide.

When entering the harbor from the westward and passing Fung shui rock great caution is necessary to guard against the cross set of the tides.

By the eastern entrance.—This entrance is difficult to recognize from seaward. Approach with the summit of Tsu san island bearing 0° astern. A small island lies off the northeastern side of Chang tau minor, and on its summit is a small native light-house. The light, which is maintained by the fishermen, is given by an ordinary oil lamp and is exhibited in May, June, and July. The channel lies between this island and the bluff point of Chang tau major and is here 600 yards wide. On entering, borrow a little on the side of the bluff, then keep in midchannel, gradually altering course to the westward as the eastern cape of Chang tau minor is passed, and proceed up the harbor in midchannel.

By this entrance the shallowest water, which is on the bar, is 19 feet. The narrowest part of the passage is at the sharpest bend, where it is only 250 yards in width, and great attention to the helm is necessary.

Approaching this entrance from the eastward, keep the northern extreme of Wasp island southward of east until Tsu san summit bears 0°, to clear the Hornets, which are covered at high-water springs.

By the eastern entrance, besides the difficulty of seeing the way in and the narrowness and sharpness of the turn, a number of fishing boats and nets have to be passed before reaching the best anchorage, and they are usually very much in the way, the nets stretching half across the harbor abreast the joss house on Chang tau major.

In May, June, and July the harbor is crowded with fishing boats, and as many as 2.300 have been counted at one time, the average crew being 10 men and boys.

Between Chang tau and Tripod island, a distance of 9 miles, there are about a dozen islands with numerous small islets and rocks.

Hall island, the largest of these islands, is 1$\frac{6}{10}$ miles long east and west, 1,500 yards wide, and has two well-defined hill tops, the western of which is 628 feet high and the eastern 607 feet high, forming a saddle between.

The summit of Hall island is in Lat. 30° 13′ 49″ N., Long. 122° 28′ 37″ E.

There is an excellent boat harbor on the northern side of the island, which has a depth of 3 fathoms in its mouth, shoaling to 1 fathom at its head, and which is sheltered from east, through south, to west-northwest. There is good anchorage in 10 to 14 fathoms, mud, off this boat harbor. Anchorage can also be obtained off the southwestern coast of the island, sheltered from northerly and easterly winds. There is a depth of 10 fathoms, $\frac{1}{2}$ mile from the shore, shoaling gradually to 1 fathom close in, the bottom being soft mud; do not open the summit of Will island westward of Hall island, to keep out of the strong stream which sets during the ebb through the gap between Hall island and Hertz islands.

Hall pass, Hewett pass, and Brenan pass are three passages through these islands available for steam vessels, but they are seldom used except by junks, the route through Steep island pass being usually taken. The passages between Hall island and Chang tau should not be used for navigation, the rate of the tidal streams being 3 to 5 knots and the ground foul.

Tripod island is easily distinguished by its three well-defined peaks, the highest and southern of which is 335 feet high. A perpendicular cliff, about 250 feet high, on the southeastern side of the island, is noticeable on northeasterly or southwesterly bearings.

Anchorage for one small vessel, sheltered from southeasterly and southerly winds, can be obtained in a small bay on the northwestern side of Tripod island, with the southern extreme of Steep island in line with the northern extreme of West Fisherman island, bearing 80°, at 600 yards from the shore, in 6 to 14 fathoms, mud.

There is also an excellent boat harbor on the western side of the island, well sheltered from north, through east, to south winds.

Steep island, 200 yards northward of Tripod island, is small, and on its southern slope there is a remarkable bowlder. The light-house on its summit is in Lat. 30° 12′ 42″ N. and Long. 122° 35′ 20″ E.

Steep Island pass is 2 miles long and 1½ miles wide; on its eastern side are Palmer islets, and on its western are Tripod and Steep islands. It is clear and 11 to 43 fathoms deep.

Light.—A circular black light-house, 47 feet high, on the summit of Steep island, exhibits, at 243 feet above high water, a revolving white light every ½ minute, visible 22 miles. The light is obscured by Tripod island, between 19° and 39°; eastward and southeastward of Video and Fisherman islands, between 300° and 270°; westward of Hall and Hewett islands, between 115° and 96°, with the exception of a ray between 112° and 114°.

The keeper's dwelling house is white.

Fog signal.—In answer to a vessel's fog signal, 3 guns are fired with an interval of 3 minutes between each; and, if the vessel's fog signal is still heard, the firing is repeated after an interval of 10 minutes.

Andersen rock, 321° 850 yards from Steep island light-house, is a pinnacle with 4 feet over it. The sea never breaks over the rock, but in the strength of the tidal streams there is generally some chow-chow water.

Fisherman islands are South Fisherman, East Fisherman, Middle Fisherman, and West Fisherman, with many islets and rocks.

West Fisherman is the highest of the islands, and it has a rather ill-defined summit 693 feet high. All the groups are rocky, precipitous, and covered with grass. They are inhabited, excepting South Fisherman island. Between West and Middle Fisherman islands there is a passage, ¾ mile wide, with depths of 25 to 39 fathoms in the fairway.

Wood islet, 1 mile southeastward of West Fisherman island, is barren, rocky, precipitous, and 129 feet high.

Palmer islets.—Two of these islets lie close together at about 400 yards northwestward of the northwestern point of West Fisherman island, the largest being 185 feet high; the third islet is ½ mile southwestward of the same point of West Fisherman, and is 98 feet high.

Anchorage.—There is anchorage for one ship, sheltered from easterly and southeasterly winds, on the northwestern side of South Fisherman island, in 10 fathoms, mud, at about 300 yards offshore, with Ballard islet just open southward of Middle Fisherman, bearing 272°, and the western extreme of Carles island in line with the eastern extreme of East Fisherman, bearing 356°.

There is also anchorage in 6 to 7 fathoms, mud, sheltered from northerly and easterly winds, at the entrance of the bay on the southwestern side of Middle Fisherman island, with Kliene islet in line with the western point of the bay. The outer rock in the middle of this bay is always visible, being awash at high-water spring tides, and has 5 fathoms close to it.

Video island is $1\frac{6}{10}$ miles long northwest and southeast and 1 mile broad. It is covered with bowlders of porphyritic rock, interspersed with grass, and has a well-defined summit, nearly in the middle of the island, 1,076 feet high.

Video island is an excellent landmark, and it is the best island of the group to make from the southward, as it is very steep on that side.

The bowlder on the summit is in Lat. 30° 08′ 04″ N., Long. 122° 45′ 48″ E.

The eastern point of the island rises in perpendicular cliffs 300 to 500 feet, and there are three remarkable tors on the ridge which connects it with the summit.

On the northern side of the island and near the coast there is a conspicuous dome-shaped white patch on the rocks, which may sometimes be discerned through mist on sunny days.

Around the island, close to the coast, are several offlying rocks; Piggott rock, 77 feet high, off the west coast, is the highest.

There is a small fishing population and only sufficient cultivation to keep them in food. The principal landing place used by the fishing boats is a small cove situated between two offlying rocks at the northwestern cape, where there is a small village; there is also a village in the bay on the northern side of the island.

Anchorages.—There is open anchorage for steam vessels on the northern side of Video in 11 to 14 fathoms, mud and shells, sheltered from southward and southwestward. In this vicinity the depths increase gradually to a distance of 600 yards offshore, when it drops suddenly to 28 fathoms.

For this anchorage bring the summit of the island to bear 178°, keep it on that bearing and anchor when the southern Sister is in line with the northern part of the Twins rocks; in this position there is room to swing. The anchorage is not safe with northerly winds.

There is also open anchorage off the southwest coast of Video, in 13 to 17 fathoms, well sheltered from northerly and easterly winds.

For this anchorage bring the summit of the island to bear 58°, keep it on that bearing, and anchor with Piggott rock in line with the summit of East Fisherman island, bearing 327°.

The passage between Video and South Fisherman island is $2\frac{4}{10}$ miles wide, with depth of 13 to 35 fathoms, the deepest water being ½ mile from Video.

Four Sisters are four rocks, about 30 feet high, situated 67° 4¾ miles from the eastern point of Video. The soundings in the vicinity of the Two Brothers and Four Sisters are about 32 fathoms; depths of less than 30 fathoms are obtained among the chain of islands to the westward.

Two Brothers are two rocks, about 30 feet high, situated 74° 8¾ miles from the eastern point of Video, or in Lat. 30° 10′ 15″ N., Long. 122° 56′ 30″ E., approximately.

The next group of islands to the southward begins with Kintang, lying about 5 miles northeastward of the mouth of the Yung river, and includes the large island of Chusan, after which the archipelago is named; the islands are grouped closely together and take the general direction of the coast as far as Nimrod sound, where the chain or archipelago practically ends.

Kintang, about 5 miles northeastward of the mouth of the Yung river and one of the larger islands of the Chusan archipelago, is 7 miles long north and south and 4¾ miles broad; it is mountainous, the two highest peaks being Kintang peak, 1,488 feet high, and Saddle hill, 1,416 feet high, both within the east coast and conspicuous. The northern part of the island is deeply indented, the bays being full of mud, and there are several islands around it. Its richly cultivated plains have been reclaimed from the sea. The island is thickly populated.

At Algerine point, the southeastern point of Kintang, a spit of rocks terminates in a rock which dries 1 foot at low water at 500 yards offshore; and Alligator rock, awash at high water, and marked by a stone beacon, painted red, lies 150 yards southward of the southern point of Kintang.

Ka mun, or Dumb islet, is about 300 yards northward of Ko point; it is 118 feet high, and there is a rock awash at low water in the passage between the point and islet.

Wang mei san, 900 yards eastward of Ka mun, is 700 yards long northeast and southwest, 400 yards broad, of a light color, being covered with grass, and has a badly defined summit 247 feet high.

Three rocky islets, 63, 111, and 40 feet high, lie about 400 yards northwestward of it and are connected with each other and Wang mei san by shoal water. Ko channel, between this group and Ka mun, has a depth of 46 fathoms in the middle; it is clear of shoals, excepting a depth of 8 fathoms at 300 yards northward of the western end of Ka mun, but the tidal streams in it are very rapid and cause tide races.

Blonde rock, a quarter of a mile northward of the northern Wang mei san islet is a pinnacle which dries 7 feet at low water; it is surmounted by a small iron beacon which has a black cage on top.

Just-in-the-way lies 188° $2\frac{6}{10}$ miles from Saddle hill and $1\frac{1}{10}$ miles off the coast of Kintang; is a small, black, rugged rock 16 feet high. A rock which dries 2 feet lies 120 yards southward of the islet.

Kintang channel is between Kintang on the north and Tai shei shan, the mainland, and Wang mei islands on the south. Just-in-the-way is nearly in the middle of the fairway. The narrowest part, between Alligator rock and the outer Sam san island, is $1\frac{6}{10}$ miles broad. A pinnacle rock upon which there is believed to be a depth of 9 fathoms, lies 251° $1\frac{1}{10}$ miles from Alligator rock, and at springs its position is indicated by a heavy tide rip.

Sam san islets are situated on the foreshore about halfway between Tai shei shan harbor and Ko point. The outer islet is $\frac{3}{4}$ mile from the shore; the inner is the largest, 90 feet high, and has a conspicuous tree on its summit. On the western side of Sam san islets a creek in the mud, suitable for boats and junks, leads to the large town Sin chi tau.

Ta utze harbor is a typhoon refuge formed by the coast of Kintang to the east, Ta utze island to the west, and Ta ping island to the north. There is room for many vessels of not more than 16 feet draft, but it is necessary to moor. When rounding the south point of Ta utze island with a flood tide, keep more than 200 yards from the shore. At spring tides there are numerous eddies in the harbor, and the cables are somewhat strained by the surging of the ship at her moorings.

Ta ping island, northwestward of Kintang, is $1\frac{3}{4}$ miles long northwest and southeast, 1 mile broad in the broadest part, and has an ill-defined summit 532 feet high. Tap islet, 600 yards northwestward of Ta ping, is 116 feet high.

Light.—A fixed white light is exhibited from a white building situated on the northwestern part of the island. This is a private light, and must not be depended on.

Fang shi, the northern of the islands northward of Kintang, from which it is distant $1\frac{3}{10}$ miles, is $\frac{3}{4}$ mile long north and south, 600 yards broad, and has a sharp summit 471 feet high. A bank of mud, upon which there are 16 feet on its outer part, extends $\frac{1}{2}$ mile northwestward of the island.

Tai shei shan islands lie off the coast 4 miles southeastward of Ken tang, and in Tower hill channel, between this point and the northern end of Tai shei shan, the water is too deep for anchorage.

This group of islands consists of one large island, six small ones, and some rocks; but the channels between them are so narrow that they can only be navigated by very small steam vessels.

Tai shei shan is of irregular shape, $3\frac{1}{2}$ miles long north and south, and $3\frac{1}{2}$ miles broad; the greater portion of the island is covered with hills, which culminate in a double peak 1,089 feet high, but there are some plains richly cultivated with rice and protected by reclamation walls. Cultivation in patches extends to the summit. There are many villages.

The northeastern coast of the island is steep-to, there being a depth of 50 fathoms within 800 yards of it. The tidal streams on this coast are rapid. Off the western coast a mud spit dries at low water 800 yards from the high-water line, and some knolls of mud with only 7 feet over them lie 600 yards beyond.

Cheun pi, eastward of Tai shei shan and separated from it by a strait 800 yards wide, is 1 mile long northwest and southeast, ¾ mile broad, and has a well-defined peak 580 feet high. The island is cultivated in patches to the summit.

Da mo, 100 yards eastward of Cheun pi, is 500 yards in diameter, and has a well-marked peak 192 feet high.

Bug gei (White Duck islet), 800 yards east-southeastward of Cheun pi, is rocky, covered with grass and short bushes, and 49 feet high. A rock, awash at high water, lies about 350 yards southwestward of it.

Na sing mei, Li sing mei, Spit island, and Red island, are four islands in Tai shei shan pass. The first two are inhabited.

The pass between Tai shei shan and the main is 400 yards wide at its narrowest part.

Tai shei shan harbor is the western reach of the channel between Tai shei shan and the main; it is 2 miles long about north-northwest and south-southeast, ¼ mile wide, well sheltered from all directions, and has good anchorage in 8 to 15 fathoms, the depths decreasing toward the bar. It is necessary to moor to keep the anchors clear and to weigh with head toward the bar.

Occasionally, when large junks are expected, the natives exhibit a fixed red light from a lamp-post on the western extreme of Tai shei shan.

The southern limit of the harbor is abreast of a rock off the main, which dries 7 feet, and has on it a stone pillar reaching 3 feet above high water.

Tides and tidal streams.—It is high water, full and change, in Tai shei shan harbor at about 10h. 20m.; springs rise 13 feet, approximately. The north-northwest going stream commences at 4 hours before high water, and the south-southeast going at 2 hours after high water.

Outer anchorage.—There is good open anchorage in 7 to 12 fathoms, mud, outside the bar, available in fine weather. It is sometimes convenient to wait here for daylight to approach Yung river.

Chusan, the largest island of the archipelago, is 22 miles long northwest and southeast, 10 miles broad, and mountainous, rising in Chusan east peak at 325°, 7 miles from the southeastern extreme of the island, to the height of 1,670 feet. The plains and many of the hills are richly cultivated. The population of the island is estimated at 200,000 to 250,000. Tinghai city, the capital of the island, is on its southern side at about 4 miles from its southwestern end and ½ mile inland.

The summer at Chusan and in its vicinity is often damp, relaxing, and enervating.

It has numerous small islands lying off its north, east, and south coasts.

Thornton island, off the northern side, and joined to Chusan at low water, is 1,100 yards long, 1,000 yards wide, and has a well-defined summit, 387 feet high, with a joss house surrounded by a wall on its top.

The island is cultivated and has a village on its southern side. There is an islet and much foul ground off its northeastern point.

Tsae island, ¾ mile northward of Chenau point, is $1\frac{4}{10}$ miles long north-northeast and south-southwest, 1,200 yards broad, and has 2 conspicuous hills, each about 600 feet high. The western slope of the island is richly cultivated, the eastern slope being very steep and covered with grass. Hwa islet lies close off its northern point, and some rocks above water lie within 300 yards of the northern point of the islet.

Fossett rock, 33°, 800 yards from the northern rock off Hwa islet, has 17 feet over it; around the rock there are 16 to 26 fathoms, mud. During the strength of the tidal stream the rock is plainly indicated by chow-chow water.

A rock, 4 feet high, lies between Fossett rock and Mei yun.

Mei yun island, 600 yards eastward of the northeastern part of Tsae, with a deep passage between, is 900 yards long north-northwest and south-southeast, 500 yards broad, and has a well-defined summit 382 feet high. There are a few inhabitants.

Mei ting, 103°, 1,600 yards from Mei yun, is an islet 450 yards long, 400 yards broad, and 146 feet high. There is foul ground for about 600 yards around westward and northward of the island.

Eaves rock, 77°, 900 yards from the summit of Mei ting, is 27 feet high. Shoal water extends 200 yards southward of it.

The passage between Jau islet and Eaves rock is safe for vessels of any draft, but the passages between Eaves rock and Mei ting and between Mei ting and Mei yun should not be attempted.

Jau islet, about 1 mile northeastward of Eaves rock, is 114 feet high. Two small rocks close together, awash at high tide, lie on the northwestern side of the islet, and the shoal water off them extends 250 yards from the islet. When bound for Tai shan channel, leave the islet on the port hand.

Pu pi san, about 6 miles southeastward of Jau islet, is 300 yards long, about 150 yards broad, covered with grass, and has a well-defined summit 152 feet high. It is uninhabited. The summit of the island is in Lat. 30° 3′ 51″ N., Long. 122° 27′ 8″ E.

Shalu rocks, about 1¼ miles east southeastward from Pu pi san (Ninepins), are 4 conspicuous black rocks and 5 smaller ones. The highest rock, which is sharp and precipitous, stands at the southwestern end of the cluster, and is 54 feet high. A ledge of foul ground extends 400 yards southwestward of it.

The general depth around Shalu rocks is 11 to 16 fathoms. The lead gives no warning of approach.

There are two pinnacles close together, one of which has 6 feet over it, at 400 yards north-northeastward of the northern rock; and there are two rocks, one of which is awash at half tide and the other has 4 feet over it at low water, at 200 yards northeastward of the eastern rock.

The passages between the highest Shalu rock and the northeastern rocks of the group and between Shalu rocks and Pu pi san are clear, but it is unadvisable to use them for navigation; from the southward and bound for Tai shan channel, pass westward of Pu pi san, keeping it close aboard in order to clear Andrews rock.

Blackwall island, situated 1½ miles westward of Chusan, is 3 miles long, 2½ miles broad, and 903 feet high. There are a few villages on it.

Blackwall pass, between Kintang and Blackwall islands, is 3 miles long, 1 mile broad, and has a general depth of 20 to 44 fathoms, with a very irregular rocky bottom.

Goulin rock lies in the pass at 600 yards off the northeastern point of Kintang; there are 6 feet over it.

A 9-fathom patch lies 283°, 1,000 yards from Rondo, and a 6-fathom patch at 288°, 1,500 yards from that islet.

Rondo, an islet 98 feet high, lies about 241°, 400 yards off the southwestern point of Blackwall island.

Anchorages.—There is tolerable anchorage, comparatively free from tidal disturbance, off the south coast of Blackwall island in 9 to 15 fathoms, mud, with Rondo island in line with the northern peak of Kintang, bearing 274°. It is necessary to moor to avoid a foul anchor.

There is anchorage in 8 to 10 fathoms on the east coast of Kintang and northeastward of Kintang peak, sheltered from the rapid streams by a rocky cape bearing 32° from the peak. Vessels must moor with anchors up and down the coast, and the westward extreme of Blackwall island shut in by the rocky cape.

Wateo island lies off the coast of Chusan at 2¾ miles northwestward of the 33-foot rock. The island is 335 feet high; a mud bank extends 800 yards northwestward of it and shoal water ½ mile southeastward. A rock 8 feet high lies 182°, 600 yards from its southwestern point. Wateo lies at the southeastern side of Ketsu pass.

Anchorage.—There is anchorage in moderate depths and out of strong tidal streams anywhere within 1 mile of the edge of the flat until 1 mile from Wateo, where the water deepens.

Steward islet, in Blackwall channel, lies 299°, $3\frac{4}{10}$ miles from Yang lo i point, $2\frac{2}{10}$ miles from the 33-foot rock, and $1\frac{8}{10}$ miles from the Kintang coast; it is about 50 yards across, 37 feet high, black, rugged, and steep-to. A rock with 13 feet water over it lies 65°, 600 yards from the islet.

Several smaller islands lie between Blackwall island and Chusan, and Ketsu pass, between Blackwall island and the islands eastward of it, is a good ship channel, 600 yards wide in its narrowest part and free from violent overfalls.

A mud bank with 14 feet over its outer part extends 1,400 yards northwestward of Blackwall island, and a rock, just covered at high water springs and around which the tidal streams are very rapid, lies 100 yards southward of the western point of the island.

Steam vessels' track.—In a steam vessel bound to the Yangtze, from ½ mile eastward of the islet, 60 feet high, eastward of Fang shi, at the northern end of Blackwall pass, steer 336° till Fang shi summit bears 178°, and thence to about 1¼ miles westward of West Volcano island, avoiding Howlin rock. Pass 1 mile northwestward of West Volcano and steer to a position 3 miles southeastward of South-east Horn, whence make good an 8° course to a position 38°, 8 miles from Gutzlaff, from which steer direct to the fairway light buoy at the entrance of the river, bearing 328° 10 miles.

Tides and tidal streams.—In Blackwall pass it is high water, full and change, at 10h. 40m. (approximate).

The northwest-going stream begins 4 hours before high water, and the southeast-going stream at 2 hours after high water; there is scarcely any slack water at springs. The rate of the streams is 3 to 8 knots, according to the time of tide and the age of the moon. A continuance of heavy rain, causing a freshet in the Tsien tang kiang, checks the northwest-going stream and much accelerates the southeast going. The tide whirls and races violently over the more shallow places, and in northerly gales there are high overfalls during the southeast-going stream.

In northwesterly gales there is a very severe overfall over the shallow spots westward of Rondo during the northwest-going stream.

Caution.—Vessels unable to maintain a speed of ten knots should not attempt to pass westward of Roundabout island, or through Tower Hill or Blackwall channels, against the strength of a spring tide ebb stream.

Blackwall and Tower Hill channels are deep, as much as 60 fathoms being obtained in some places, where the conformation of the land has rendered the scour of the tide most effective. There are no dangers except the rock situated 65°, 600 yards from Steward islet. It is necessary to work the helm quickly and keep in the deepest part of the channel—and consequently in the most rapid tidal stream—which is mid-passage in Tower Hill channel and midway between Steward islet and Kintang. Between North Ketau point and the islands southward of Chusan the distance is a little over 2 miles; but Tower Hill channel, between Ta mau and Cheun pi, is only 1¼ miles wide.

Tide ripplings in Tower Hill channel are very heavy, and the rate of the stream is 3 to 7 knots according to the age of the moon.

Tinghai approaches.—Amongst the islands fronting the south coast of Chusan off Tinghai there are three channels of approach to the anchorage known as Tinghai harbor; the first through Tower Hill channel, Bell channel, and North Bun ji channel is the safest and is recommended for large vessels.

Directions.—Pass 1,200 yards northwestward of Ta mau; 500 yards southeastward of Si ha ji; round the northern part of Bun ji at about the same distance; thence pass about 200 yards northwestward of Sio wu kwe san and Wu kwe san, and to the anchorage. With the southeast-going stream, and even after the main stream has slacked, guard against being set on the western end of Sio wu kwe san. Vessels of much length must pass southward of Sio wu kwe san, and thence about 400 yards northward of To ju to the anchorage northward of Tsing tio.

Melville channel.—It is shorter than the first passage, but it is not recommended for large vessels or vessels with small steam power, as it is only 300 yards wide in its narrowest part, which is between the sunken Melville and Dundas rocks and Black rock, and the rapid tidal streams, going through four different channels, form eddies that at times make a vessel unmanageable.

Directions.—It is preferable to enter with the flood stream. Leave Sio dun chi on the port hand and bring its eastern extreme in line with the extreme of Trunk point, the eastern point of Tsen yo san, which mark leads between the Ledge and Melville rock, and between Black rock and Dundas rock. When clear of Dundas rock keep in the center of the channel and steer for the western end of Sio wu kwe san, rounding it at the distance of 200 yards to avoid the Middle ground.

There is no difficulty in using this channel in handy steam vessels of good power and moderate size; care must be taken to keep the leading mark on, and it is necessary to work the helm quickly, watching the swirls and meeting them in time with the proper helm.

Deer island channel is a branch of Melville channel and lies between Sio ju and Sarah and To ju islands; its width is nearly 400 yards, but Elliot patch, with 19 feet over it, lies almost in the center of its narrowest part, and the tidal streams in the channel are rapid and embarrassing. In using this channel keep Sio ju aboard to clear Melville rock and the mud flat southward of Sarah island. Tsing tio rock may be passed on either side, but there is a patch with 17 feet on it at 200 yards to the eastward.

South Bun ji channel should not be used for navigation, as Davy rock is in the middle of the western entrance, Eddy rock is southward of Sio Bun ji, the channel is only about 400 feet wide between the southeastern point of Sio Bun ji and Cap rock, and the tidal streams have a rate of 3 to 5 knots.

Eastern entrance to Ting hai.—Having passed Tsing tio rock steer northward along the coast of Chusan, guarding against going on the shoal extending 700 yards southeastward of Wu kwe san, pass 200 yards eastward of Grave island, then between Parry rock and the coast of Chusan in mid-channel, and to the anchorage in the harbor. The least depth in the fairway by this entrance is 3¾ fathoms. Deer Island channel and this entrance to the harbor, though narrow at Parry rock, are easier to navigate than Melville channel.

Tinghai harbor, northward of Wu kwe san and eastward of the Middle ground, is about ½ mile long east and west, and 350 yards broad, with depths of 3 to 12 fathoms.

Sio wu kwe san, about ½ mile northeastward of Bun ji, is about 400 yards in extent and 170 feet high. Wu kwe san, or Trumball island, northeastward of it and separated by the narrow channel, Ko lo man, is rather larger, 265 feet high, and wooded. Shoal water with less than 3 fathoms extends 600 yards eastward of Wu kwe san, and Grave islet, a rock 40 feet high, lies near its northeastern extreme.

Parry rock, ¾ mile northward of Grave islet, is awash at half tide; a damaged beacon on it covers at half tide. There is a deep channel between this rock and the coast of Chusan about 400 feet wide.

Sio chusan, nearly 1,400 yards northwestward of Sio wu kwe san, is 400 yards long north and south, nearly 200 yards broad, and 70 feet high; it is separated from the main by a narrow channel through which the tidal streams set with rapidity. On the point northward of the island there is a fort, and there are two forts on the coast at ¾ mile to the westward; all mandarins passing these forts with their flags flying are saluted from each of them with three guns.

Middle ground, on which there is a least depth of 1½ feet, extends about 800 yards each way within the depth of 3 fathoms and lies in the western entrance of Tinghai harbor, with a channel about 200 yards wide between it and Sio chusan, and a channel nearly 400 yards wide between it and Sio wu kwe san and Wu kwe san.

Ta mau summit, showing over the southern slope of the hills on Bun ji, leads southeastward of the Middle ground in 4 fathoms, but it is better to pass Sio wu kwe san and Wu kwe san at about 200 yards distance.

Anchorage.—The best anchorage in Tinghai harbor is southwestward of Joss hill in 6 fathoms, mud, with Parry rock in line with the 580 feet hill northward of Beacon hill, 106°, and the western point of Sio wu kwe san open an angle of 6° of the western point of Wu kwe san. This anchorage is at times blocked by junks, which, however, usually anchor between the Middle ground and Chusan.

It is necessary to moor, as the tidal streams and eddies are very strong.

Large vessels should anchor northward of Tsing tio beacon in 12 fathoms, with Parry rock in line with Joss hill bluff, 336°; and Cap rock in line with the northwestern part of Sarah island, 228°; in this position the tidal streams are fairly steady in direction and there are but few eddies.

Southeastward of Wu kwe san the bottom is very uneven and there are heavy swirls and eddies.

Tides and tidal streams.—It is high water, full and change, at 10h. 5m.; springs rise 10 feet 7 inches, neaps range 3 to 6 inches. The northwest-going stream begins about 3 hours before high water and the southeast-going stream about 2½ hours after high water.

Tinghai city is nearly 2 miles in circumference, and is surrounded by a wall 24 feet high and 13 feet wide, surmounted by a parapet 4 feet high and 2 feet wide. The southern wall runs east and west, and is ½ mile long. A canal 33 feet broad and 3 to 5 feet deep almost encircles the city and enters it by the southern gate, which is a little over ½ mile from the shore of the harbor. The principal gate is at the southwestern corner. Canals form the chief means of transport, the roads being merely footpaths between the paddy fields. On the coast of this part of Chusan an embankment 20 feet high prevents the encroachment of the sea on the rice fields. Every large field has its own canal for the purpose of irrigation and carriage of the produce. There is a broad paved way from Tinghai to the northern coast of the island. The population of the city is estimated at 30,000 to 40,000.

Trade.—The principal exports are salt fish, cotton, opium, vegetabes, tallow, sweet potatoes, wheat, salt, and firewood.

Supplies are plentiful and very cheap; they can also be obtained by steamer from Ningpo. Water is not good at Tinghai, but it can be obtained for boilers and is brought off by sampans carrying about 1½ tons at $1 a ton.

Communication.—Two steamers run weekly between Tinghai and Ningpo and visit the principal ports in the Chusan group.

Typhoons during the season frequently pass over the Chusan archipelago. The sea in Tinghai harbor during one of these storms was smooth, but clouds of spray were blown over a ship anchored there, and the spray with the heavy driving rain obscured everything; on account of the strong tidal streams the ship rode principally beam and stern to the wind, and, although a steam vessel, she was at times quite unmanageable.

Ta mau (Tower Hill island) lies about 2 miles northeasterly from Tai shei shan, is 2 miles long north and south, 1½ miles wide, and rises to a well-defined peak with a flattish top 1,075 feet high. The island is cultivated in patches to its summit.

Ta mau peak is in Lat. 29° 56′ 58″ N., Long. 122° 02′ 16″ E. A bank with less than 3 fathoms extends northwestward of the island, and there the 5 fathoms contour line is nearly 600 yards northwestward of the line joining the points.

Tidal streams.—The tidal streams around Ta mau are rapid, but in the deep-water channel between it and Si ha ji to the northward, their rate becomes reduced to 2 to 3 knots.

Yang lo i san is a small island 200 yards across, situated 200 yards southward of Yang lo i point, the southwestern point of Chusan; it is 100 feet high, rocky, and covered with grass.

Si ha ji (Bell island), 1,700 yards northward of Ta mau, with a deep channel between, is 305 feet high and of irregular shape; quarries are worked in its southeastern part.

A shoal, on which is a least depth of 6 feet, extends northward about 200 yards from 200 yards northward of the northern point of the island; and Kwo wu tio rocks, marked by a stone beacon on their center part, lie 14°, about 600 yards, from the northern point of the island, leaving a deep channel 250 yards wide between them and Chusan.

Ching du san and O ki san are two islets lying off the Chusan coast northwestward of Si ha ji.

Lo i dur mang, the channel between Si ha ji and Chusan with the islets off it, should not be used owing to the swirl of the tidal streams, which may set a vessel on the rock in the center of the channel. But this route is always taken by the local steam vessels, which pass near the southern point of Ching du san, then steer to pass northward of Kwo wu tio rocks, and through the middle of North Bun ji channel.

Tsen yo san (Elephant island) is 1½ miles eastward of Ta mau, and four islands lie in the space between. It is 1½ miles long north and south, ½ mile broad, and has a sharp precipitous rocky hill, 693 feet high, near its southern end.

To tzu san, the eastern of the four islands between Ta mau and Tsen yo san, is 1,600 yards long north and south, about 400 yards broad, and 260 feet high. Hecla rocks, awash at high water, surrounded by a mud flat and connected to the island by shoal water, extend over 400 yards from the middle of its eastern side.

Davy rock, with 9 feet of water over it, lies 349°, nearly 400 yards, from the northwestern point of To tzu san.

Sio tsen ya, an island 200 yards northward of Tsen yo san, is 500 yards long north and south, narrow, and 223 feet high.

Fury rock, with 10 feet water on it, lies 288°, 500 yards from the northern point of Sio tsen ya.

Kao san and Pe san are two islets connected by reefs, extending about 250 yards north and south. Their southern part is 200 yards northward of Sio tsen ya. There are uneven soundings between these islets and Fury rock.

Rip rock, a pinnacle awash at low water, lies just over 200 yards southeastward of Kao san.

Sio dun chi (Round islet), 78° ½ mile from the northern point of Tsen yo san, is about 80 yards across and 50 feet high.

To dun chi san, the southern end of which is 800 yards northeastward of the northern point of Tsen yo san, is nearly ½ mile long north-northwest and south-southeast, 300 yards broad, and rises in Harry peak to a cone 245 feet high. Ling ju san is on its northern side, a narrow channel running between.

Duck rocks, 200 yards south-southwestward of To dun chi san, are about 1 foot above high water.

To king san, 400 yards northeastward of To dun chi san, is nearly 400 yards long northeast and southwest, less than 200 yards broad, and 85 feet high. Cap rock, 100 yards northward of the island, is connected to it by a reef and is 16 feet high.

Black rock, 300 yards northeastward of To king san, is 2 feet high and the highest part of a reef about 100 yards in extent.

The Ledge is a reef of rocks extending 150 yards eastward of To king san; it dries 2 feet at its outer edge and the tidal streams set rapidly across it as soon as it is covered.

Melville rock, 78° 400 yards from the extreme of the ledge, has 9 feet water over it.

Dundas rock, 355° 400 yards from Melville rock, is of small extent and has a least depth of 6 feet on it; the tidal streams are rapid and swirl round this and Melville rocks.

Sarah island, the southwestern extreme of which is 200 yards 24° from Dundas rock, is 300 yards long east-northeast and west-southwest, 100 yards broad, and 60 feet high. Shoal water extends 100 yards southwestward of it.

To ju island, close eastward of Sarah island, is nearly 600 yards long northeast and southwest, 200 yards wide, and 125 feet high. This island and Sarah island are connected by a mud flat which with the shoal water off it extends 250 yards northwestward of the line joining the northern points of the islands and over 400 yards southward of the eastern point of Sarah island. A shoal extends 80 yards eastward of To ju.

Elliot patch, about 250 yards southward of the eastern end of To ju, has 19 feet over it.

Bun ji (Tea island), 1$\frac{2}{10}$ miles northward of Tsen yo san, is 1¾ miles long north and south, 1 mile broad, and a ridge of hills, the summit of which is 520 feet high, runs north and south through it. On its eastern side are paddy fields, and salt pans on the mud where it only covers at high-water springs.

Sio Bun ji lies off the southeastern side of Bun ji and there is a narrow channel between only available for boats at low water. Eddy rock, 150 yards southward of Sio Bun ji, has 6 feet water over it.

There are four islets off the southern coast of Bun ji southeastward of Sio Bun ji.

Ta wan ja pan, or Bell rock, is 200 yards westward of the southwestern part of Bun ji. There is a rock 200 yards south-southeastward of its southern end, from which rock a bank extends south-southwestward 400 yards.

In the channels between these islands the tidal streams are rapid and the eddies and swirls at springs are dangerous to boats.

Anchorage.—There is good anchorage between Bun ji and Si ha ji in 11 to 12 fathoms, mud, in mid-channel, but rather nearer Bun ji, where the tidal streams are weaker and run more evenly than in other places in the vicinity. There is also anchorage at about 600 yards north-northeastward of Tiang tio chu, the northern point of Bun ji, in 16 to 17 fathoms, but this position is not recommended on account of the strong tidal streams and eddies.

Nab rock, with 10 feet water over it, lies off the coast of Chusan at 900 yards north-northwestward of Tiang tio chu; and a rock with 7 feet water over it lies 900 yards north-northeastward of this point.

Sio ju (Deer island), nearly a mile northeastward of Tsen yo san, is of a rounded shape, 1¾ miles long north and south, ¾ mile broad, and has 3 rounded peaks, the highest of which is 670 feet high. Stone walls are built between the points of the bays, and the land thus reclaimed is cultivated. The 2 small islets, Mu san, stand on a mud flat southward of Sio ju, which almost connects with Deer point, the southwestern extreme of the island.

Tsing tio rock, 600 yards northward of the northern point of Sio ju, dries 8 feet. A 17-foot patch lies 200 yards, 70°, from the rock.

Hang fu san, an islet 500 yards northwest and southeast, 1 cable broad and 130 feet high, lies ½ mile southward of Sio ju.

Sung san is eastward of Sio ju, a narrow but deep channel passing between; the tidal streams are very rapid in this channel and it should not be used for navigation.

Sung san tio is a reef of rocks, on which is a stone beacon at 200 yards southward of the southwestern point of Sung san; a reef of rocks which dries at low water extends 200 yards south-southwestward of it.

Ko san, 400 yards northward of Sung san, is an islet about 100 yards across, 70 feet high, and covered with small fir trees; there is a rock above water southward of it, connected by a rocky ledge which covers at high water. Fang wo san, 400 yards northward of Ko san, is an islet 60 feet high, and between these islets there is a reef which dries 3 feet, and a rock 3 feet high.

Ao san, southeastward of Sung san, is 1¾ miles long east and west, 1 mile broad, and has a well-defined peak near the southwestern end which is 412 feet high. Shoal water extends about 1,600 yards eastward of it; its southern point is nearly steep-to, and rocks 72, 8, and 12 feet high extend 600 yards southward of its southwestern point. Kun hi, a rock 63 feet high, lies ½ mile westward of these rocks. and there is shoal water for ¼ mile around it to the westward.

Jan ji lies northward of Ao san, and a mud flat on which is Mun du san, extends 2½ miles southeastward of it. Several rocky islets lie northwestward of Jan ji.

There is an inshore channel, named Shei lu, close to the southern coast of Chusan, which is available for very small vessels, with a draft not over 10 feet, passing between Sinkeamun and Tinghai; it is very narrow northwestward of Jan ji.

The eastern end of Chusan, 1¾ miles northeastward of Lu shi san, has on it a small temple built of large stone slabs. Lokea island, between Lu shi san and the eastern part of Chusan, is surrounded by a mud flat, except on its northern side; there are 4 islets on the flat to the southward and southwestward. Mautse, 1¼ miles westward of Lokea, and Siau kau, 1¼ miles farther westward, are connected by shallow water, and rocks above water with shoal water between them lie ½ mile southward of Siau kau.

Sinkeamun harbor, between Lokea island and Chusan, is 500 yards wide with 4 and 5 fathoms water in it abreast the town. The southwestern entrance to the harbor, between Lokea and Mautse island, has not more than 2¼ fathoms in it at low water; mud extends westward 900 yards from Lokea, and a rock lies 200 yards southward of the eastern end of Mautse.

Chukea island is divided into 2 parts, Tong sing or North Chukea, and Sik fong or South Chukea. It is about 7 miles long, north and south, and on its western side are many deep indentations, some of which are inclosed from the sea by stonewalls. Near the southern extreme of Sik fong are 4 remarkable peaks, and near the center of the island is Chukea peak, a smooth-topped cone, 1,257 feet high, which is prominent.

There are several indentations on the eastern side of Chukea; Wolf bay, the southern, is shallow but affords anchorage for small craft at times in the northeast monsoon. Drayson islet, on the northern side of the bay, is 145 feet high and black; rocks extend $\frac{1}{4}$ mile southward of it and terminate in Red islet, 71 feet high; Rocky islet, 80 feet high, lies 600 yards southeastward of Drayson islet; a reef extends about 400 yards southward of it; and Wolf rock, which breaks with easterly winds and sea, lies 900 yards, 140°, from Red islet. Pillar rock, 70°, $1\frac{6}{10}$ miles from Cambria point, the southeastern extreme of Sik fong, is peaked, 98 feet high, and 2 reefs, showing at half tide, extend 400 yards northeastward of it. A reef, dry at low water, lies about 600 yards southward of the southern part of Pelican point, the northern point of the small inlet northward of Wolf bay; and Tooth or Nob rock, 60 feet high, lies east-northeastward 600 yards from the eastern part of the point.

Yangsi islet, 180 feet high, lies off the northeastern point of Tong sing; and Chakian islet, 224 feet high, with 2 rocks above water on its northern side, lies about 400 yards northeastward of the northwestern point of Tong sing.

Pu tu, the sacred island of the archipelago, lies $1\frac{4}{10}$ miles northward of Tong sing and $1\frac{3}{4}$ miles eastward of Hwang head, the eastern extreme of Chusan, from which it is separated by the Linhwa yang channel. The island is $3\frac{1}{2}$ miles long north and south and in one place only $\frac{1}{2}$ mile across. A point projects from the eastern side of the island, forming a sandy bay southward of it. Cawston rock, which dries, lies about 300 yards southward of this point. The western side of Pu tu is shoal, the 2-fathom line of soundings being 600 yards off it. An islet lies off the northern end of Pu tu, and about 600 yards north-northeastward of the islet is Joseph islet, which is 34 feet high and has deep water around it.

The temples on Pu tu are numerous, but the two largest, on its eastern side, are falling into ruins. The landing place of the pilgrims who visit the island is at a causeway on the eastern side.

A stream runs into the bay on the eastern side of Pu tu.

A considerable fishery is carried on eastward of Pu tu island, and the fish (preserved in ice during summer) are taken principally to Ningpo.

Anchorage.—There is anchorage off the eastern side of Pu tu in 12 to 14 fathoms, but difficulty is experienced in weighing the anchors. It is much exposed and not recommended.

Isthmus island lies ¾ mile northeastward of Pu tu, and the channel between is deep. The island is 1¾ miles long north-northwest and south-southeast, from 100 to 800 yards wide, and 288 feet high. A reef extends about 800 yards northward of the island, and near its northern extreme is Marines islet, small, black, rocky, and 30 feet high. Andrews rock lies 30° 600 yards from Marines islet; it has two heads 100 yards apart, on the northern of which there are 9 feet and on the southern 13 feet; the rock is indicated by chowchow water. A rock 6 feet high lies 700 yards eastward of the eastern point of Isthmus island, and from the rock a reef extends ¼ mile southwestward.

Helby rock, a pinnacle with 19 feet of water over it and 9 to 28 fathoms around, lies about 400 yards southward of the southern point of Isthmus island.

Hochung rock, a sunken pinnacle, having a depth of 1¾ fathoms over it at low water spring tides, and 9 to 13 fathoms around, lies 325° 1½ miles from Loka light-house.

East islet, a small islet 13 feet high, lies 81° 4 miles from Loka light-house.

Channel eastward of Chusan.—Hwang head, the eastern point of Chusan, is a peninsula 193 feet high. Thence the coast of Chusan trends 4¼ miles south-southwestward to Entrance point, which is 436 feet high and the southeastern point of the island.

The northwestern and western coasts of Pu tu island are shoal-to, leaving, however, a channel between them and Hwang head nearly 1 mile wide; the northern part of this channel has only 4 fathoms on it.

A flat extends southwestward of a line from the northeastern part of Tong sing to the northern part of Chakian, and thence in a curve to Hwang head. Between Tong sing and Chusan is Fung si jok or Kin ho, an island connected to Se ing do and surrounded by a mud flat which dries; this mud flat extends southeastward to Tong sing and is crossed by a gutter with a depth of 3 feet in it. On the edge of the mud flat, northwestward of Fung si jok, is Chu choi reef with a stone pillar on it. There is a channel 400 yards wide between this stone pillar and Entrance point, and the flat toward Pu tu may be crossed in 1½ fathoms at low water, but the bottom is hard in places and this passage should not be taken by vessels drawing over 12 feet.

Tidal streams.—Off entrance point the north-going stream begins at 3½ hours before high water, and the south-going stream begins at 2½ hours after high water.

Loka island, 800 yards northward of Pi sha, is about ½ mile in extent and 307 feet high.

Light.—A circular white light-house, 29 feet high, on the northern point of Loka island, exhibits at 128 feet above high water, a fixed light, which shows white from 343° to 273° through an arc of 70°; red, from 273° to 256° through an arc of 17°; white, from 256° to 202° through an arc of 54°; red, from 202° through 180° to 89°; white, from 89° to 75° through an arc of 14°; obscured by Loka island from 75° through 0° to 343°. The white light is visible 15 miles and the red light 7 miles.

Lakea island, the southern end of which is 29°, 2½ miles from Pelican point, is 1$\frac{3}{10}$ miles long north and south, about ½ mile wide, and 500 feet high. Lakeati islet, 204 feet high, lies off its southeastern point. Pi sha island, about 1,400 yards wide and 514 feet high, is connected with the northwestern side of Lakea by a reef. Eccles islet, 140 feet high, lies about ¼ mile eastward of the division between them; the intermediate space is foul.

Iffland channel, between these islands and Tong sing, is ¾ mile wide.

Pelican rock lies about 2 miles east-southeasterly from Pelican point, only shows at low water springs; when covered it is generally indicated by the disturbed water.

Piting islet lies about 5 miles east by south of Pelican point; is about 200 yards wide and 152 feet high; two rocks above water lie on its northwestern side, and a reef extends nearly 400 yards northeastward from it.

Tongting islet lies about 3½ miles east by south from Piting island, is about 400 yards wide, 184 feet high, and there are detached reefs southwestward of it.

Light.—A group flashing white light, showing a group of four flashes in quick succession every 20 seconds and visible 19 miles, is exhibited from a white tower 28 feet above the ground and 180 feet above high water, located on the summit of Tonting island.

Fog signal is a fog horn giving one blast of about 2 seconds duration every 20 seconds.

The coast from Ko point to Tai shei shan harbor trends generally about 120° for 8 miles, and along it an extensive foreshore of mud dries out from high-water line for a distance of 1 mile. At about 1¾ miles westward of the harbor entrance there are 2 conspicuous rocks on the mud, which are 8 feet and 52 feet high.

From Tai shei shan harbor the coast trends about 85° for 10 miles to North Ketau point.

Ketau point.—The peninsula, of which the Ketau points form the northeastern end, is mountainous, its highest point being mount Union, which lies 260° 19 miles from Ketau point and is 2,143 feet high. The country is thickly populated and under cultivation, the plains being covered with rice and cotton fields and the valley terraced with small plantations, in some places to a height of 800 feet; there are many patches of cultivation on the summits of the highest mountains. Ketau point is bold and steep-to, and from it the coast curves northward about 2 miles to North Ketau point; the land within these points rises abruptly in grassy ranges to Ketau peak, which is ¾ mile inland and 1,286 feet high.

Roundabout island, 35°, 1¼ miles from Ketau point, is 400 yards long north-northeast and south-southwest, 200 yards wide, rocky and steep around, covered with grass, 121 feet high, with a round top. Landing can be effected on either side. There is a rock 2 feet high 100 yards from its southern point, with which it is connected at lowest springs. The summit of Roundabout is in Lat. 29° 53′ 54″ N., Long. 122° 08′ 54″ E.

Between Ketau point and Roundabout island there are from 39 to 44 fathoms. Vessels of any draft can pass through, but tide ripplings are heavy and the tidal eddies strong.

Tides.—It is high water, full and change, at Roundabout island at 10h. 2m.; springs rise 13 feet 2 inches, neaps 8 feet 9 inches; neaps range 3 feet 6 inches; extraordinary springs rise 15 feet. The moon in perigee at full or change; a passing typhoon or strong wind in the offing raises the water 1 foot higher than usual.

The highest tide is usually 2 days after full or change of the moon.

A mark thus /|\ has been cut on the rocks near a rocky point at the southwestern end of a perpendicular cliff on the southeastern side of Roundabout island. The line is 8 feet 7 inches above the normal mean sea level during summer.

Tidal streams.—The rate of the tidal streams near Roundabout island is 2 to 6 knots, and there are whirls and eddies caused by the meeting of the various streams, the water never being at rest. As a rule the northwest-going stream northward of the island begins 3 hours before high water, and the southeast-going stream 2 hours after high water. A vessel passing Fa tu 2 hours before high water at Roundabout island will keep a favorable stream through Blackwall pass, and it will be strong unless there has been a freshet in the Tsien tang kiang.

Tang fau island lies about 7 miles east-southeastward of Roundabout island, is nearly 3½ miles long east and west, 1½ miles broad, and 607 feet high. There are several islets and rocks between Do ying pusa and Tang fau, and this passage should not be used for navigation.

Silautse (Belt island) is 1 mile westward of Tang fau, the channel between being much occupied by shoals and rocks. It is 512 feet high. At ½ mile southwestward of it is Sinte islet, 192 feet high. Sir mo ni (Hayes islet), 1 mile westward of the northwestern point of Silautse, is a rock 37 feet high. On the northern side of Tang fau are the Duck islands, Two Hummock island, and several islets and rocks.

Tau hwa is bold and precipitous, and the peak of the island rises 1,792 feet above the sea. Near its western end is Miller's Thumb, a peculiar perpendicular crag, 873 feet high, which is noticeable.

Do ying pusa (Peak island) is 481 feet high, and lies off the northeastern side of Tau hwa; the channel between, about ¼ mile in width, is not navigable, owing to reefs and rapid tidal streams. There are two rocks within 200 yards of the eastern side of Do ying pusa.

Usha island lies about 1¼ miles eastward of Do ying pusa and on the northern side of Sarah Galley channel. Its coast is steep and cliffy, and its southern and highest part is 617 feet high. Off its western end is a ledge of rocks.

Sarah Galley channel lies between Do ying pusa and Usha island. It is undesirable on account of rocks midway in the channel.

Laush (Jansen islet) lies in the entrance at 73°, 3 miles from Agnew point, the southeastern point of Tau hwa; it is steep and cliffy, with rocks extending 300 yards from its southern end; a half-tide rock lies 295° 1¼ miles from the northern end of Laush.

Channel rocks are two rocky patches, awash at high water, lying northeast and southwest, ¼ mile apart, and the southwestern rock is situated 290° 1,200 yards from the western point of Usha.

Cambrian pass, between Usha and the large island Sik fong or South Chukea, is 400 yards wide, but it should not be used without a commanding breeze, as the tidal streams are rapid.

Ho ji (Vernon island).—The eastern end of this island is rugged with large bowlders of granite on it; a cove runs westward for ¾ mile from this end and affords shelter for boats. A large bay on the northeastern side of Ho ji, in which are some islets and reefs, has anchorage in it in about 800 yards; water may be procured from the several cascades on Tau hwa island and the casks can be filled in the boats.

Vernon channel is between Ho ji island on the southwest and Tau hwa island on the northeast; by this channel the distance from Tsen yo san, off Ting hai harbor, to sea is only 17 miles; it should not, however, be used by sailing vessels with light winds, as calms and flaws are frequent under the high land of Tau hwa, the water generally is deep, and the tidal streams are rapid.

Vernon channel at its eastern entrance is 1½ miles wide, but 5 miles within it is divided into two passages by Jan pai or John Peak island, which has a rock lying 100 yards from its northeast extreme, which uncovers at the last quarter ebb. The passage is only 700 yards wide between this rock and the Scott islets and some rocks on the northeastern side of the channel. The passage betwen Jan pai and Ho ji is ½ mile wide, and there is good anchorage on the southern side of Jan pai.

Tidal streams.—The northwest-going stream commences 3½ hours before high water by the shore, and the southeast stream commences 2½ hours after high water by the shore.

In the Sarah Galley channel the streams turn at the same time as in the Vernon channel.

Chu mor dong (Conical Hill island) lies between Ho mun and Vernon; an islet is close southeastward of it, and there is also an islet about 400 yards southwestward of its western end, the passage eastward of which is foul. Hobart channel lies between Chu mor dong and Ho ji, and in it are two islets, the reefs off which render the channel intricate.

Fo jia (Conway island) lies $1\frac{8}{10}$ miles northwestward of Chu mor dong, and northward of it is a group of islets and rocks, through which there is a passage into Vernon channel; but owing to the rapid streams, it should not be attempted without local knowledge. There is good anchorage in 10 fathoms on the northwestern side of Fo jia. Northwestward of Fo jia, Nunpi, Steer, Tsuh, and Forbes islets, and Pai rock, which is 3 miles from Fo jia, form the northeastern side of the Tau sau mun.

Mo ta tau (Beak island), eastward of Lu wang, is 4 miles long, northwest and southeast, in some parts very narrow, and remarkable for two hummocks near its western end. Off Beak head are three islets, and southwestward of the head are several islets and a rock, between which and Lu wang is port Rouse, a convenient stopping place for a vessel awaiting the tidal stream through Tau sau mun. The channel between Lu wang and Mo ta tau has a least depth of 3½ fathoms; but it is narrow and other passages are much better.

Off the northeastern side of Mo ta tau are three reefs, two lying 600 yards and 100 yards from the shore; and off its northern side are Gull, Ho mun or Shag, and Lung dun or Puffin islands. Mogs reef the northern rock of which is always above water, extends ½ mile north and south between Gull island and Ho mun, and narrows the Tau sau mun to about 800 yards; a reef also extends northwestward 600 yards from the western end of Lung dun, Jin mo dun, a rock drying 13 feet, being near its outer end. At about 1 mile farther westward and on the edge of the mud flat extending off Lu wang are the two islets Ma mau chea and Li mau chea.

Yuen islet, 1½ miles northwestward of Ma mau chea, is 10 feet high, and Rugged rock, 1¼ miles north-northwestward of Yuen, is 91 feet high and has foul ground around it. In the bight in the coast of Lu wang to the southward of these islets the mud dries 1,400 yards out and landing is difficult there except at high water.

Beak head channel is northeastward of Lu wang and Mo ta tau, and between those islands and Ho ji and the islands and rocks lying westward and northwestward of it. Its eastern entrance between

Beak head, the eastern extreme of Mo ta tau, and Vernon point, the eastern end of Ho ji, is 2¾ miles wide.

Lu Wang, about ½ mile westward of Mo ta tau and one of the large islands of the Chusan archipelago, is 9¼ miles long northwest and southeast, and it varies from 6 to 1½ miles in breadth. The plains are cultivated and irrigated by canals. A ridge of hills, covered with stunted gum trees and patches of cultivation, traverses the middle of the island and branches at the northern end to three capes. The highest part is the northwestern Helby peak at the northern end of the island, which is 982 feet above the sea; the lesser peak, southeastward of it, is 948 feet high. A hill at the southeastern end of Lu wang, 902 feet high, is conspicuous.

The south coast of Lu wang is rugged and deeply indented, with Reef island, North Reef island, and Flake island, which are rocky, uninhabited, and covered with grass, off it. Reef and North Reef islands are connected at low water, and there is shoal water with depths of 1 to 3 fathoms between them and Flake. A mud bank dries out 400 yards from the northwestern side of Flake.

Duffield rocks.—A line of black rocks extends 1,200 yards southwestward of Clarence point, the southern point of the western headland of Lu wang, and terminates in a rock which dries 4 feet at low water. The highest Duffield rock, which is 53 feet high, rugged, and steep-to, is 350 yards within the outer rock and 800 yards from the point. There is a depth of 48 fathoms within 400 yards of the outer rock.

The coast from the western point of the western headland of Lu wang trends north-northeastward for 3¾ miles to Yutin point and is steep-to and affords no anchorage; it then turns sharply east-northeastward for 2½ miles to cape Lu wang. In the middle of this latter stretch there is an isolated hill 97 feet high which was once an island and has been reclaimed.

Tancred rock, about 300 yards off the west coast of Lu wang at 1,800 yards northward of the western point of the western headland, is 3 feet high and there is a depth of 14 fathoms close outside it.

Bird rock, which dries 10 feet, lies 200 yards off a point at 1,200 yards southward of Yutin point. A substantal red post, rising 8 feet above high water, has been fixed in the middle of the rock. There are 5 fathoms close around the rock and 42 fathoms within 1,400 yards outside of it.

An islet 24 feet high, 200 yards off the coast of Lu wang and 600 yards southward of Bird rock, is steep-to around.

Anchorages.—The anchorage in 5 to 7 fathoms, southward of Flake and westward of Reef islands, is very good and well protected. In fine weather there is good anchorage anywhere between Lu wang and Nimrod sound.

There is anchorage off the north coast of Lu wang in 13 fathoms mud.

Tidal streams.—The tidal stream at the anchorage off Reef islands commences to set northwestward at 3½ hours before high water on the shore, and southeastward at 2½ hours after high water.

The stream at the anchorage off the north coast of Lu wang begins to set east-northeastward at 2 hours before high water, and west-southwestward at 4 hours after high water on the shore.

At both anchorages the rate of the streams is 1 to 3 knots, according to the age of the moon.

Me san group, about 1½ miles to the southward of Lu wang, consists of 10 islands and islets, together with many rocks. Me san, the largest and highest island, is 1 mile long northeast and southwest, 700 yards broad, precipitous on its eastern side, of a light color, being covered with grass, and its sharp summit is 511 feet high. Shoal water, with depths of 2 to 3 fathoms, extends 2¾ miles northwestward of the group.

Tinker islet, half a mile southward of Me san, is 200 yards long, 100 yards wide, 68 feet high, black and rugged. It is steep-to; a small pinnacle rock, which has 1 foot water over it, and on which the sea seldom breaks, lies ½ mile east-southeastward of it. Between the Tinker and the off-lying rocks of Me san there is a depth of 8 fathoms. The channel between the Tinker and Starboard Jack is 1½ miles wide, and the depth 5½ to 7 fathoms, mud.

Starboard Jack, about 2 miles south-southeastward of Tinker islet, is a rugged, black rock about 100 yards long, 50 yards wide, and 30 feet high; 200 yards northward of it is a rock 2 feet high, and 400 yards eastward of it is a rock which dries 6 feet at low water.

Shu shan (Mouse islet), about 4½ miles east by south from Starboard Jack, is a circular black rock, 14 feet high and about 40 yards in diameter. A rock, which dries 8 feet at low water, lies 400 yards northwestward of it. The depth around and between the rocks is 6 to 7 fathoms.

Fa tu island, 1 mile westward of Lu wang, is somewhat irregular in shape, 2½ miles long northeast and southwest and 1 mile broad. A ridge of hills, covered with grass, culminates in a well-defined summit, 604 feet high, near the north end of the island. There are several villages, and the reclaimed land is well cultivated.

Gough pass, between Fa tu and the Central islands, is ½ mile wide in the narrowest part, where it is steep-to on both sides, and it has a greatest depth of 50 fathoms. This is the best of the Fa tu channels. In navigating the pass keep in mid-channel. It can be navigated at night with local knowledge. The tidal streams turn at the same time as in the Duffield pass, and have nearly the same rate.

Hebe and Chloe islands, about 600 yards northeastward of Fa tu, are both irregular in shape; Hebe is 230 feet high, and Chloe, at 600 yards northwestward of it, is 140 feet high. A rock, which dries 5 feet, lies 200 yards northwestward of the northwestern point of Chloe.

Young Hebe rock, 400 yards eastward of Hebe island and situated with the northeastern points of Hebe and Chloe in line, has a depth of 11 feet water over it. A 5-fathom patch, surrounded by depths of 23 to 51 fathoms, lies 60° 700 yards from the northeastern point of Hebe.

The Notches are 2 rugged islets covered with grass and about 400 feet apart, situated halfway between Lu wang and Fa tu. The southwestern islet is 50 feet high; the northeastern is 55 feet high, and a rock which dries 8 feet lies 500 yards westward of this islet.

St. Andrew island, 400 yards southward of Fa tu and connected with it at low water by a mud flat, is rock, with a well-defined summit 403 feet high, and it is uninhabited.

A rock, 77 feet high, lies 28° 800 yards from the eastern point of St. Andrew; there are 2 smaller rocks above water within 400 yards northward of it, and a 3-fathom shoal between it and St. Andrew.

Wen chau island, 350 yards southwestward of St. Andrew, is 600 yards long, a little over 400 yards broad, 253 feet high, steep-to, and covered with grass; it is uninhabited. A 3-fathom patch lies 300 yards southward of the island.

The tidal streams are very rapid in the channel between Wen chau and St. Andrew, where the depth reaches 41 fathoms.

Duffield pass is the eastern of the three Fa tu channels and is extremely pretty, the Lu wang slopes being well wooded and much broken up. It is 4¼ miles in length between the Duffield rocks and Bird rock, and in the narrowest part, which is between the Notches and Tancred rock, it is ½ mile wide, with a greatest depth of 47 fathoms. The channel is eastward of Young Hebe rock.

Vessels should not pass between the Notches and Fa tu, nor should Duffield pass be navigated at night.

The tidal streams at the Notches are slack at half tide on the shore. The northeast-going stream commences at 2½ hours before high water; and the southwest going at 3½ hours after high water; the time of the turn of the stream is slightly advanced or delayed by the direction of the prevailing wind, and its rate varies with the age of the moon from 3 to 5 knots an hour.

Anchorage in moderate depth can be obtained between Lu wang and the mainland from anywhere north of the Damson islands to within ½ mile of Ketau point.

Fa tu channels are three in number, namely, Roberts pass, between Mei shan and the Central islands; Gough pass, between the Central islands and Fa tu; and Duffield pass, between Fa tu and Lu wang. Gough pass is the best, as it is clear of shoals, and the shore is steep-to on both sides.

Roberts pass is not recommended, as the lead gives no warning of approach to the mud bank extending southeastward from Mei shan; and when the mud is covered, the appearance of the pass is deceptive. At its narrowest part Roberts pass is only 800 yards wide.

Central islands, between Mei shan, from the southern point of which the islands are $1\frac{1}{10}$ miles southeastward, and Fa tu, from the western point of which the islands are 1,200 yards northwestward, are one island and three rocky islets extending northeast and southwest for 1 mile. La tau san island, the southern of the group, is 800 yards long, 400 yards broad, and has an ill-defined summit 191 feet high; a mud bank extends 600 yards southwestward of the island, and on its northwestern edge is a rock 26 feet high, and between La tau san and the rock is a small rock awash at low water.

A rock which dries 4 feet, lies 150 yards northeastward of the northern islet of the group.

Mei shan, or Plum island, appears to have been formerly one large island and about a dozen small islands and islets, which are now united by substantial stone walls stretching from point to point. The entire plain within the walls is cultivated with rice and cotton and is thickly populated. The island is 3¾ miles long, northeast and southwest, and 1½ miles broad. The highest part is southwestward of the center of the island, and is a rounded, badly defined top, 490 feet high.

At 400 yards from the eastern end of Mei shan are the two Damson islands; the northern island, Pak shei, is 160 feet high, and the southern island, Ching lung, is 232 feet high.

Combe rock is a pinnacle with 3 feet over it, nearly 400 yards southeastward of the southeastern point of Pak shei.

An extensive mud bank fronts Mei shan on the southeastern, southern, and southwestern sides, reaching in the form of a spit 3 miles from the southwestern end of the island, and in the middle of the foreshore, eastward of the southern point of the island, there are three rocky islets. This mud bank is steep-to on the southern and eastern sides.

Stretching $2\frac{3}{10}$ miles northeastward of Mei shan there is an extensive mud bank which terminates in a point, in a depth of 18 feet at low water.

Junk channel, between Mei shan and the main, is 7½ miles long, and has a general depth in the middle of 4 to 6 fathoms, but it shallows on the southwestern end to 1¾ fathoms, and narrows to 225 yards. It is not used for navigation even by small steam vessels.

Bateman island lies 3 miles southwestward from the southern point of Mei shan, is about 150 yards across, 82 feet high, rocky, covered with grass and scrub, and has a round top. A rock, 5 feet high, lies 300 yards southward of the island.

The coast from Ketau point to Ta sung kiang entrance trends generally southwestward for a distance of 19 miles. Several islands, islets, and rocks lie off this coast, the principal island being Mei shan (Plum island), the summit of which is 8½ miles from Sail rock and 9½ miles from Ketau point.

Sing lo san, 2½ miles southwestward of Ketau point and 150 yards from the mainland, is a rocky islet, 200 yards in diameter, with a peaked summit 136 feet high.

Extensive mud flats front the coast between Mei shan and Ta sung kiang and cover only at high water springs. Landing is most difficult except in the Ta sung kiang and in Junk channel. Portions of these flats are being and have been reclaimed.

CHAPTER VI.

NIMROD SOUND TO MIN RIVER.

Nimrod sound is an inlet running 27 miles west-southwestward from its entrance between Hunter point and Sail rock, lying northwestward. The width of the sound is about 3 miles at its entrance, decreasing to 1,600 yards at Parker island; it then increases gradually to about 2¾ miles, but much of this part is occupied by islands. The depth is generally from 5 to 10 fathoms; in places it reaches 20 fathoms.

The Chinese propose to establish a naval base in this sound at Hsi hu inlet.

Northern shore.—Sail rock, at the northwestern entrance to the sound and 200 yards inside the low-water line, is a perpendicular, square-shaped rock, 24 feet high. Southwestward of this rock and distant 1$\frac{4}{10}$ miles is the entrance of the Ta sung kiang, which affords easy access for boats and junks to Ta sung city.

From the entrance of this river the shore trends southwestward 11 miles to Tasong point; Barren island lies about 600 yards offshore at 4 miles above the river, and the Nimrod islands form practically the northern shore of the sound from 2¾ to 4½ miles above that island.

Parker island is southwestward of Tasong point, and Danger rocks, which are steep-to and uncover at half ebb, lie 800 yards off the eastern end of the island.

Fishing stakes extend nearly across the sound in a position just above Entrance island.

Westward of Parker island there are several islands and rocks on the northern shore, and at 6 miles above Parker point, the southern point of Parker island, is the southeastern point of an island from which rocks extend southeastward and terminate in a half-tide rock at 3 cables from the point. The channel between this rock and the nearest point of the Treble islands is 1,200 yards wide. Hewett point is 4$\frac{3}{10}$ miles above the half-tide rock.

Fern island lies 1½ miles southeastward of Hewett point, and 1,200 yards northward of the island is a rock with 9 feet water over it.

The head of the sound westward of a line between Hewett and Bight points forms several bays and creeks, with some deep water, but generally shallow, in which are many rocks and islets.

In the shallow bight, northwestward of Treble islands, is Tung ju village, off which at a sufficient distance from the shoal water there is good anchorage in 6 to 7 fathoms, mud. From Tung ju village a paved footpath leads to Sin sho, a village 10 miles distant and situated on the Funghwa branch of the Yung river, the distance thence to Ningpo being 20 miles in a direct line; and on the southern side of the sound, at 2½ miles above Bight point, is a paved footpath about 7 miles long leading to San mun bay.

Southern shore of the sound from Hunter point trends about 255° for $6\frac{8}{10}$ miles to Nimrod point, which is high with several rocks lying less than 600 yards off it. Cone rock, 18 feet high, lies 1,200 yards northward of Cone point, which is $4\frac{2}{10}$ miles from Hunter point, and David islet lies 200 yards off shore at 1,200 yards above Cone point. From Nimrod point the shore trends southwestward for 5¼ miles to the northern entrance point of Medusa creek. Middle island lies in mid-channel at 4 miles above Nimrod point.

Medusa creek extends eastward about 4 miles; its width varies, but is about 1,400 yards, till it opens out into a basin; it is much occupied by shallow flats; the depth in the fairway is generally 4 to 6 fathoms.

Above Medusa creek the shore continues west-southwestward about 10 miles to Bight point. At 3 miles above Medusa creek is the entrance of a small river with 4 feet in it at low water and navigable by boats to a village 3 or 4 miles inland. At 7 miles above Medusa creek is the northeastern point of the Treble islands, which extend 2¾ miles southwestward.

Tides and tidal streams.—It is high water, full and change, at the entrance of Nimrod sound at about 10h. 0m.; springs rise 13 feet (approximate); and at the head of the sound at 10h. 30m.; springs rise 20 feet. The rate of the tidal streams at the entrance is 3 knots at springs, and the streams turn a few minutes after high and low water on the shore. In the channel southward of Parker island the streams are strong.

Chu mung (Hunter islands), off Hunter point, are six in number with some rocks. The eastern is the largest, highest, and the most conspicuous of these islands; it is 400 yards long, 300 yards broad, of a light color, precipitous on the eastern side, and has a well defined summit 195 feet high. These islands are not inhabited.

Pearl rock, the northern of the Hunter group, lying 353°, 1¼ miles from Hunter point, is small and 18 feet high.

Buffalo Nose channel (Nu pi shan channel) extends between the Kue shan islands and the Fa tu channels. It is 20 miles long, and in its narrowest part it is 3½ miles broad, the depth throughout being 3¾ to 6 fathoms, mud. Starboard Jack is in the fairway and is generally left on the starboard hand when bound northward, but there is a safe passage between it and Tinker with a depth of 6 fathoms, mud bottom.

For low-powered steam vessels or vessels in tow drawing 20 feet or less this smooth-water passage into the Chusan group is useful during winter when northerly winds prevail.

When a typhoon is passing in the offing and a high easterly swell, its invariable precursor, is setting in upon the coast, which happens perhaps twice a year, but scarcely ever in winter, vessels drawing over 16 feet should not use this channel, as the swell occasionally rises 8 feet above the mean level and the depth in places is 23 feet at low-water springs.

Nu pi shan (Buffalo Nose island) lies on the southwestern side of Nu pi shan channel and about 1½ miles from the mainland. It is 1¼ miles long north-northeast and south-southwest and ¾ mile broad. Its eastern side is precipitous; its western side has one deep indentation, which nearly divides the island into two parts, and there are four peaks, the highest 400 feet above the sea, being 700 yards from the southern end. The island is of a light color and partially cultivated by natives, who visit it for the purpose. Its northeastern point is perforated. A rock 38 feet high lies 400 yards off its northeastern side, and a rock 78 feet high lies 300 yards off its northwestern point.

No supplies can be obtained.

Ploughman, an island northwestward ¾ mile from Nu pi shan, is ½ mile long north and south, 600 yards broad, rocky, precipitous, covered with grass, and has a flat ill-defined summit 388 feet high.

Between this island and Hunter point, on the mainland at 4½ miles westward, there are two irregularly shaped islands named Lok yu and Tunic, 148 feet and 170 feet high, respectively; a rock, 6 feet high, lies 78°, ½ mile from the northern end of Lok yu.

Corkers, which lie 1¾ miles southeastward of Buffalo nose island, are 10 islets and some rocks, in 3 groups, with a general depth of 4 to 4¼ fathoms around. Hong yan zor (Red eye rock), at the southwestern part of the group, has precipitous sides, and is 110 feet high. The others have no conspicuous feature, and the highest is 52 feet. Two hundred yards eastward of the southeastern Corker there is a rock awash at low water and 200 yards eastward from the northeastern Corker there is a rock awash at high water.

Needle peak, westward of the Corkers, and about 3 miles inland, is 1,770 feet high, precipitous, and sharp.

Whelps, which lie 4½ miles south-southeastward of the Corkers, are 4 rocks in 2 groups of 2, which are north and south of each other, 600 yards apart, steep-to, and covered with grass. The highest, largest, and southern islet of the group is situated 30°, $6\frac{3}{10}$ miles from the northeastern rock off Dai muk, and is 300 yards long, 100 yards wide, and 90 feet high.

The eastern rock of the northern group is 82 feet high.

Pylades rock lies 3½ miles south-southwestward of the Whelps; is of small extent and awash at low water springs. The sea only breaks on the rock at low water, unless with a heavy swell.

Dai muk (Bear island) lies 7 miles south-southwestward of the Whelps; is ¾ mile long east and west, and 800 yards broad; it is precipitous, of dark color, and 500 feet high. There are three rocks off its northeastern point, the outer one is 800 yards from the island and 17 feet high. The 3-fathom contour line passes about 2 miles eastward of the island.

The islands off this coast are uninhabited, but the natives visit them for purposes of cultivation.

Coast.—Mount Thornton, 1,467 feet high, is about 1¾ miles inland northwestward of Dai muk. Jack ji, 1 mile northward of Mount Thornton, is a walled town and much frequented by fishermen in spring. Ching min and Mor ore islands, northeastward and eastward of the town, afford protection for boats in northeast and east winds, and numerous fishing boats often anchor there in the season.

Chong san yuen, a large city, is 4 miles westward of Jack ji.

Budei islands, about 3½ miles southward of Dai muk, are two in number, with a narrow boat channel between them; the western island has a sharp, well-defined summit, 307 feet high, and a rock 78 feet high lies off its northwestern point; the eastern island is 116 feet high. An islet 80 feet high lies 600 yards northward of the eastern part of the eastern island, and 200 yards eastward of the islet is a rock, 42 feet high, connected by a reef to another islet, 45 feet high, 600 yards farther eastward. The 3-fathoms contour line is about ½ mile seaward of these rocks.

Shang san island and Dan men rock lie between Budei and the main; the southern of two rocks, 400 yards apart north and south and 37 and 20 feet high, lies ½ mile northeastward of Shang san.

Kweshan islands are nine in number with many islets and rocks; they are bold and rugged, of a light color, and covered with grass.

Daiwan, the highest and largest island, situated near the center of the group, is 3 miles long northeast and southwest, and varies from 200 yards to ¾ mile in breadth. Its highest peak, which is near the western end of the island, is 511 feet high. There is a considerable fishing population, the principal village being on the northwestern coast in the center of the island and close to a narrow isthmus where it is nearly divided into two parts. Fresh water is good, but there are no other supplies.

Kun su wan is the northwestern island of the group, and it is connected on its southeastern side at low water with Observatory hill islet, which is 78 feet high. There is good anchorage for vessels of 20 feet draft and under, with Observatory hill just open of the southern extreme of Kun su wan bearing 77°, and Kun su wan summit north, in 5 fathoms, mud. This anchorage is over 400 yards from Kun su wan and 400 yards from the mud bank which extends $1\frac{4}{10}$ miles northwestward from Dai wan, and it is useful in northerly and northeasterly gales. In fine weather vessels anchor with safety and comfort westward of the group.

Dai ching, southwestward of Daiwan, from which it is separated by a narrow chanel, is 488 feet high. A rock, awash at low water, is nearly 400 yards southward of the island, and a rock, drying 8 feet, lies a similar distance westward of it.

Two rocks, named Oliver rocks, lie southward of Daiching; the outer, which is awash at low water, lies 181° 1,300 yards from the southwestern point of the island.

Holderness rocks are two rocky heads 30 feet apart, with 6 feet water over them, situated 282° 1,200 yards from the southwestern point of Daiching.

Patahekok, the southern island of the group, is the most conspicuous and remarkable of the Kweshan islands, and is precipitous on its southern and eastern sides, with a well-defined summit 503 feet high. There is a detached rock off its southern end, separated by a deep, narrow cleft, noticeable on east-northeasterly and west-southwesterly bearings, in which is a sharp pinnacle about 15 feet high. A rock, 105 feet high, lies ¼ mile eastward of the northeastern point of the island, and the passage between is foul.

Patahekok summit is in Lat. 29° 22′ 45″ N., Long. 122° 13′ 16″ E.

Four islets lie within $1\frac{4}{10}$ miles west-northwestward of Patahekok, and Twist islet, 134 feet high, bears 278° 1½ miles from its western point.

Chit kuk (Crooked island), 18° 4½ miles from Patahekok, is the southeastern of a chain of islets forming the northern portion of the group; it has a peaked summit 282 feet high.

Tides and tidal streams.—It is high water, full and change, at the Kweshan islands at 8h. 35m.; springs rise 13 feet 6 inches. The tidal streams are rotary, thus: The stream during first half of the flood sets between south and west; during the last half between west and north; during the first half of the ebb getween north and east; and during the last half between east and south—so far as the conformation of the land will allow—at a rate of 1 to 3 knots, according to the age of the moon.

Cliff islands, about 11 miles west-southwestward of Patahekok, are 3 rocky islands and some small rocks; at 17° $1\frac{6}{10}$ miles from the eastern point of the eastern of these islands is a rock, which dries 5 feet.

There are 2 islands, close together and surrounded by a shoal, at about 1,600 yards southward of the Cliff islands.

Half-tide rock lies easterly a little southerly, 5 miles from the southernmost cliff island. High tides and smooth water prevent this rock being seen.

Bangao islands, three in number, lie about 3 miles south-southwestward of the cliff islands; Wang chi is the name of the middle of these islands, and ¼ mile southeastward of it are Bangao rocks, which are above water and have deep water close to them, except westward, where the depth is 2¼ fathoms; to avoid this do not bring the higher fort on Tung mun southward of 270°.

Trading junks sometimes anchor southward of Bangao islands, but on signs of bad weather they run into Shih phu harbor.

The coast from the entrance of Nimrod sound to the Bangao islands trends southward about 22 miles. The aspect of the land is mountainous and rugged, with many off-lying islands, islets, and rocks; extensive mud flats front the coast, and there are few places where landing is convenient. The large plains are cultivated and thickly populated, and there is much cultivation upon the hills.

Caution.—The sea in this locality is thick with mud, which prevents anything in it being seen.

Montague island (Tantausan), about 5 miles southward of the Cliff islands, is 732 feet high and nearly divided into two parts, the connection being a low shingly isthmus; the northern portion is named San tau san (Gore island). Three rocks or islets lie within 1$\frac{2}{10}$ miles north-northeastward of the northeastern point of San tau san. An islet lies at 8° 1,200 yards and another at 43° 1,600 yards from northeast point of Tan tau san, and a detached islet lies off the southeastern point of that island. There is indifferent anchorage in Sheipu road, on the southwestern side of Tan tau san, in about 3½ fathoms, mud, even bottom, but the tidal streams are strong and a heavy swell is usual.

Nutuwan island, about 2 miles westward of Montague island, is 8 miles in length north and south, and, roughly, about 4 miles in breadth. Nose islet is nearly connected with the east coast of Nutuwan at 2$\frac{3}{10}$ miles northward of cape Conway, the southeastern point of the island; a reef extends 400 yards eastward of the islet.

Taimun island is separated from the northeastern part of Nutuwan by a channel which is only about 300 yards in width at its narrowest part. The channel between Taimun and Montague island has general depths of 9 to 15 feet; there are several islets and rocks covered at high water in it.

Ching shu, or Cliff islet, lies in this channel at 1¼ miles eastward of the northeastern part of Taimun and is 84 feet high; 200 yards northwestward is another islet 102 feet high, northwestward of which there is anchorage in 4 fathoms, but with a strong wind a considerable swell rolls in, and with the rapid streams it is unsafe.

Yi lu (Startle island) about 1½ miles southward of Montague island, appears from a short distance as two islands. Both ends are of moderate height, the northern the larger and higher of the two, being 149 feet high.

Ellis island, 70° $3\frac{3}{10}$ miles from Nose islet, has rocks lying northeastward and southwestward of it, and a rock about ¼ mile northwestward.

Medusa rock, above water, lies about 3 miles south by west of Ellis island.

The Twins are two rocks above water, about ½ mile apart, east-southeast and west-northwest, with sunken rocks between them. The southeastern Twin lies about 1¾ miles south by east from Medusa rock and the western Twin lies about 1½ miles southerly from Medusa rock.

Heroine rock lies about 2 miles southwesterly from the eastern Twin, is small, dries 4 feet at low-water springs, and has depths of 5 to 7 fathoms close around.

Leaming island lies immediately to the southward of Nutuwan and is about 1½ miles long northeast and southwest.

Sheipu harbor is between the mainland and Nutuwan island, with the islands westward of it, and at high water has the appearance of a splendid basin, but when the tide is out the mud dries a long distance offshore, giving it the appearance of a river. At its western end is a passage into Sanmun bay, and on its southern shore there is another, which is very narrow and shallow with several rocks in it, leading between Nutuwan and Kinyang islands into the bay westward of Leaming island. Sheipu town stands on the main, forming the northern boundary of the harbor, near the sea, and is important principally as a convenient stopping place for coasting vessels.

Tungmun island is northward of Taimun and almost blocks the eastern entrance to the harbor.

There are 3 very narrow entrances, with rapid tidal streams and chowchow water in them, leading into Sheipu harbor. The entrance between Taimun and Nutuwan is long and narrow, and near its southeastern mouth is a small flat islet with rocks which dry within about 600 yards eastward from it; the Chinese junk men never use this entrance, and they report rocks in mid-channel and heavy tide rips.

In the center of the entrance between Taimun and Tungmun island, and just within it, is Sphinx rock, which lies in the narrowest part of the channel, where it is about 200 yards wide; the least water on the rock is 4 feet, with irregular soundings around, the deepest water being toward Taimun island; it is believed to be very small and quite smooth. This passage is not recommended.

The entrance between Tungmun and the main, although tortuous and narrow, is used by junks; there is also less chowchow water than in the entrance between Tungmun and Taimun. There are only 10 feet on the tail of the shoal eastward of this entrance.

Sanmun bay entrance is between the Chain islands and Leaming island, 11½ miles northeastward. Sanmun islets, between which and the land westward the water is shallow, lie 4 miles north-northeastward of Chain islands, and extend 3½ miles northwestward. Sanchesan, or Triple island, is 5½ miles east-northeastward of the Sanmun islets, the depth between being about 5½ fathoms; and it is 2½ miles southwestward of Leaming island, the depth between being 10 to 12 fathoms.

There is good anchorage in the northeast monsoon immediately westward of Leaming island; a berth of 400 yards must be given to the southwestern point of the island, to avoid a reef lying off it; the soundings shoal quickly after the north peak of the island bears southward of east; the bottom is soft mud.

Tafu island is on the northern side of the bay at 6 miles within Leaming; Albert peak, a remarkable thumb about 800 feet high, rises on the northern end of the island.

Cone islet, about 1,600 yards southwestward of the southwestern point of Tafu, has a reef extending about 400 yards southwestward of its southern end, and several rocks lie eastward of its northeastern point; there is also a rock or islet ½ mile east-southeastward of it; and 1,200 yards northwestward of Cone island is a small islet with a rock off its southeastern side. At 276° 4 miles from Cone island is a small islet lying in the fairway to the rivers Haeyu and Ninghau.

St. George island is 4 miles northwestward of the Cone, and the water shoals gradually as it is approached; anchorage in 3 fathoms at ½ mile southward of it is secure in northeast winds. There is a well of good water on this island, but it is not easily got at nor plentiful.

Tahwa inlet extends a considerable distance northward of St. George island and is shoal and full of rocks. At 4 miles north-northeastward of St. George island is the entrance of a passage having some islands and the mainland on its northern side, and Kin, Kinyang, and Nutu islands on its southern side, and leading to sea through Sheipu harbor, which is frequently used by junks.

Westward of St. George island is a group of high islands, of which Tinwan is the largest, and there are several islets and rocks on the eastern side of the group. Between the group and the main westward is the channel of Ninghau river, 1 mile wide. Southwestward of Tinwan is the entrance of a smaller river, on the bar of which the depth is only 4 feet, but with deep water inside; on the left bank of this river at 5 miles from Tinwan is the walled town Kientiu. Between Kientiu and Tautiu point, westward of Tinwan, the hills rise abruptly to the height of about 1,000 feet; shallow water extends 1 mile off the shore.

The entrance of the Ninghau is 6 miles above Tinwan, and there is good anchorage southward of Quarry island, which is about 4 miles above Tautiu, in from 6 to 4 fathoms; a mud spit extends 2 miles eastward of Quarry island.

Tides.—It is high water, full and change, at the anchorage under St. George island at 10h. 20m.; springs rise about 15 feet.

Hieshan islands, 3 inhabited islands and 8 rocks, the nearest of which lies 18 miles southeasterly from cape Conway, occupies a space of about 5½ miles northeast and southwest, but the islands are too small and detached to afford shelter. The rocks are steep, with remarkable cliffs. The inhabitants, who are Fuhkien men, call the islands Ung shan; they are all fishermen, and excellent fish may be obtained.

Saddle island (Nan yu shan), the southern and largest of this group, is 320 feet high and makes like a saddle.

Shaho island (Pei yu shan) is about a mile northeastward of Saddle island; its southeastern extreme is a remarkable cliff; it is surrounded by rocks for a distance of about 1,200 yards.

Light.—A white cylindrical tower, 55 feet high, on the southeastern summit of Shaho (Pei yu shan) exhibits, at 345 feet above high water, a group-flashing white light every 30 seconds, thus: Flash, 1½ seconds; eclipse, 5 seconds; flash, 1½ seconds; eclipse, 22 seconds; visible from a distance of 26 miles, except between 40° and 53° over an arc of 13°, where it is obscured by Saddle island. The light may be visible between the 2 peaks of Saddle island, or from 44° to 48°, when near its extreme range. The dwellings and boundary wall are painted white.

Cheng rock, or islet, is about ¾ mile northeastward of Shaho.

Mushroom, the northern islet, 354° 1½ miles from Cheng rock, is so much undermined by the sea that it bears some resemblance to a large mushroom. A quarter of a mile north-northwestward of Mushroom islet is a rock awash at low water, and at 52° 1¾ miles from Mushroom is a rock with 8 feet water over it.

Chain islands, 3 in number, lie at the southwestern side of the entrance to San Mun bay. At 400 yards southward of the center island is a half-tide rock; and there is a rock awash and 2 small islets lying off the western end of the southern island. Between Chin and Pine Cone to the southward the ground has not been examined.

Caution.—Keep eastward of the Tungchu group, for the water inside Chusu, Kinmen, and Chain islands is shallow, and in it there are several rocks covered at high water.

Fall island, 4½ miles southeastward of Chain island, has off its western end 2 rocks above and 1 below water.

Barren bay.—Kinmen island lies northward of Gautau and between them is Barren bay, which is 2¼ miles wide at its northeastern entrance. There are rocks off the eastern point of Kinmen, and a mud spit off the northwestern point of Gautau. Immediately southwestward of Kinmen, and separated by a deep-water channel rather more than 200 yards across, in Nine Pin island, divided near the center by a sandy isthmus on which is the rock from which the island is named. At 400 yards southward from the western end of Nine Pin is a rock dry at half tide; and a rock, awash at ⅓ ebb, is situated 400 yards eastward of the island. Indifferent shelter may be obtained between Gautau and Nine Pin in from 6 to 3 fathoms, the deeper water being toward the latter. In taking Barren bay channel from the southward, after passing Fir Cone steer for Nine Pin island, give it a berth of about ½ mile and keep the coast of Kinmen island close aboard.

There is a channel westward of Nine Pin, but it is not recommended, as there are depths of 1¾ and 2 fathoms northward of the island, and between it and Pine Cone, an islet lying 2¼ miles northwestward. A group of rocks lies ¾ mile northeastward of Pine Cone islet; and a rock or islet lies about 333° 2 miles from the Cone.

Gautau, on the southern side of Barren bay, has 4 barren peaks; the channel between Tungchu and Gautau has not been examined; there is generally a heavy swell in it. The low northeastern promontory of Gautau is an island at high water; and there is a half-tide rock 358° 600 yards from its northeastern extreme. Foul ground extends about ¾ mile westward of Gautau.

Tungchu (Bella Vista island), about 3 miles southeastward from Gautau, and the easternmost of this group, is 700 feet high. Reef islets, 2 in number, lie about 211° 2½ miles from its southern point; a reef extends eastward from the southern of the two. Midway between the northern Reef islet and the northern end of Chusu is a cluster of rocks.

Anchorage may be obtained in the northeast monsoon under the southern side of Tungchu, but there is generally a heavy swell which renders riding there unpleasant.

Chusu island, about 3 miles southwestward of Gautau island, is remarkable, and rises to a sharp cone 670 feet high; there is a beacon on its western summit. Nearly midway between Chusu and the Squall island are 4 rocks; and 123° 2¾ miles from the highest part of Chusu is a solitary rock named Fir Cone.

Squall islands, 2 in number and the southern of the Tungchu group, lie about 4 miles southeastward of Chusu, and so close together as to appear as one, except on east-northeasterly and west-southwesterly bearings. Rocks lie off the northeastern and northwestern points of the northern island, and a reef extends from the southeastern end of the southern island. Junks shelter under the western point of the southern island during strong northeast winds. A group of rocks lies about 283° 3 miles from the Squalls.

Caution.—More dangers are reported to exist between the Squall islands and Gautau than are charted; caution is therefore necessary in navigation.

Crate islet, 2½ miles eastward of the Squall islands, is small and cliffy, and the channel between has 8 fathoms in it; but the western end of Crate is not steep-to.

Taichau bay and river.—Taichau bay, northwestward of the Taichau islands, is wide and shallow, and at its head, 17 miles westward of Chusu cone, is the entrance to Taichau river. On the right bank of the river, at about 2 miles within its entrance, is the walled town Haimun, 4 miles above which is the confluence of the 2 branches of the river, 1 flowing southeastward, the other northeastward.

Taichau fu is on the northern branch of the river, about 24 miles in a direct line from Haimun. There are only 8 feet at low water across the bay to the entrance of the river; possibly vessels of 12 feet draft could cross the bar at high water, and the tide, which rises from 18 to 20 feet at springs, would carry them up to the city (Taichau fu).

The depths decrease gradually from Squall islands toward the head of Taichau bay. The deepest water across the bar of the bay is maintained by passing close southward of Mud islet, which is a hill on the mud on the northern side of the bay and the northern mud bank.

The tidal streams in the river are rapid, and there are sometimes numerous fishing nets in the bay.

The channel between Chusu and Mud islet is shallow, with several rocks in it covered at high water. A rock, dry at low water, lies 358° 1$\frac{3}{10}$ miles from the northwestern islet of the Chusu group.

Islands and rocks.—A chain of islands and islets, most of which are connected with the mainland at low water, extends about 12 miles southward from the southern side of Taichau bay. North Foreland is the northeastern of these islets, and southward of it there are 2 other islets.

A rock, awash at low-water spring tides, lies with the northern point of Low Chikhok bearing 149°, distant 2¾ miles. This rock is generally marked by a red buoy, placed near it by the junk men frequenting the locality.

At 337° 6½ miles from the northern point of Low Chikhok is a half-tide rock.

Low Chikhok island lies about 9 miles south-southeastward of North Foreland island and there is a half-tide rock 600 yards northeastward of it. Crookback island is 1½ miles westward of Chikhok; there are many rocks around it, of which those on its eastern side narrow the channel between it and Chikhok to 1 mile. There is anchorage southwestward of Crookback in 2¾ fathoms, but a long swell sets in, and the channel northward of it is shallow.

The channels among the islands northwestward of Chikhok are also shallow.

Chikhok island lies about 1 mile to the southward of Low Chikhok. It rises in a cone to the height of 760 feet. There is a broad yellow stripe on its southeastern side, and it is an excellent landmark.

Taichau islands.—At 85° 9½ miles from Chikhok is Heachu islet, the southern of the Taichau group, having off its southern side the remarkable Finger rock; this islet has a conspicuous yellow streak down its southeastern side. Kisan islet lies 1¼ miles northwestward of Heachu, and there are 3 rocks above water nearly midway between them. At 243° 1 mile from Kisan is a rock which covers at high water, and at 240° $1\frac{6}{10}$ miles from Kisan is a rock always above water.

The group extends 9 miles northward of Heachu and consists of 12 islands. Between the two largest islands is an excellent harbor, access to which both from eastward and westward is easy. Heata, the southern of these two islands, is 750 feet high; Shangta, the northern, is inhabited.

A rock which uncovers at 4 hours ebb lies south-southwestward 300 yards from the northwestern islet of the group, and several other rocks lie between it and the northwestern point of Shangta.

Water can be obtained on Shangta.

Shang rock, 2 miles north-northeastward of Shangta, is a fair-sized island and about 100 feet high. The passage between is from 9 to 12 fathoms deep.

Anchorage.—The best anchorage during the northeast monsoon is southeastward of the islets extending from the southwestern point of Shangta. The holding ground is excellent, and shelter has been obtained here during a typhoon.

Tides.—It is high water, full and change, at the anchorage at 9h. 0m.; springs rise 14 feet.

Taupung island, about 4 miles southwestward of Chikhok, is 7½ miles long north-northeast and south-southwest, 1½ miles broad, and forms the eastern side of Yevan bay, which is shoal and affords no shelter. The island is separated from the main by a channel 1 mile wide, almost filled with banks, but leaving Penetration pass, a narrow passage used by the native trading craft. Near the northern end of the pass, on the main, is Songmen, a walled town.

At 234° $2\frac{4}{10}$ miles from Songmen point, the southwestern end of Taupung, is a flat rock above water, and a similar rock is situated

212° 2 9/10 miles from the point. Southeastward of the point are 3 islets; Sanshi, the inner islet, has a reef off its western side, and the outer islet has a shoal off its northeastern end. There is a navigable channel 1 mile broad with depths of 4 to 5 fathoms between Sanshi and the rocks off the point.

Shetung islet, 3¼ miles northeastward of Sanshi, has a reef lying 600 yards from its southwestern point, and many rocky islets off its southern end; there is indifferent shelter in the northeast monsoon under the islet.

Between Shetung and Taupung island are 2 islets forming 3 channels, the eastern of which, between Shetung and the next islet westward, has 3¼ fathoms in it, but the others are narrow and unnavigable. Junks lie inside the inner islet, where there is a small village. Northeastward of the eastern of these 2 islets are 3 rocks above water, the northern of which has a reef off its eastern end.

The Stragglers, a group of rocks, lie nearly a mile southeastward from the rocks southward of Shetung, and 1½ miles northeastward of the Stragglers is Soudan islet, the eastern islet of the group, about 120 feet high, flat topped, with a reef off its southern side.

Peshan island, 9 miles south-southwesterly from Taupung, is 1½ miles long, east and west; there are 3 rocks off its northern side and 2 islets close together about ¾ mile southeastward of it. Flare islet, 1 mile northwestward of Peshan, is low and flat, and Sugarloaf islet with a small islet close northward of it is 1¾ miles northward of the Flare.

Fishing stakes, connected by heavy ropes, extend for several miles at a distance of about 8 miles from Peshan and to the southeastward of it.

Taluk island, about 4 miles westward of Peshan, is 770 feet high and the highest of these islands. Rocks extend northward of Taluk, and the passage between them and Tauan is about ¾ mile wide.

Seoluk islets, 3 in number, lying north and south, are situated 1¼ to 2½ miles southward of Taluk. Northwestward of these islets the water is shoal, and in using the passage between them and Taluk give Seoluk a wide berth; and there is probably as little as 3 fathoms on the course from Taluk to Sugarloaf islet.

Chinki, the western of these islands, is low and flat, with a large village on it; the bay northwestward of Chinki is shoal, and at its head is the entrance to Hebe lock.

Tauan island is 1,600 yards northeastward of Chinki; there are depths of 4 fathoms in the channel between them, but there is a sunken rock in the middle of this channel, and a reef extends northeastward from Chinki; its navigation should not be attempted. There is shoal water with several rocks between Tauan island and Hebe head on the mainland 1½ miles northwestward. There is anchorage between

Chinki and Taluk in 3 to 4 fathoms; a shoal of 12 feet lies 1 mile westward of Taluk.

Tides.—It is high water, full and change, at the anchorage between Chinki and Taluk at 9h. 20m.; springs rise 13 feet.

Tau island—Kemong harbor.—Between the 2 southeastern points of Tau, off the southern of which is Nampan islet and off the eastern also an islet, is Kemong harbor, a bight affording shelter to junks, but it is confined, and there is better anchorage eastward, under either Taluk or Seoluk islands.

Meier rock, awash at low water, lies in the middle of Kemong harbor entrance; from the rock the southeastern point of Nampan bears 232° distant nearly 1,800 yards.

Kwanta island is 3½ miles southward of Tau island, and on its western side the water shoals very suddenly. There is a channel between Kwanta and Cliff islets, about 2½ miles to the southeast, and also between Kwanta and Tau to the north; but the islets and rocks within about 2¼ miles northeastward of Kwanta, being only partially surveyed, should not be approached, and caution is necessary in the locality.

Lot sin bay, westward of Tau island, runs northward 20 miles; in its southern parts there is good anchorage; the head of the bay is shoal, except Hebe lock, a narrow outlet northward of Tau island, and between it and the main.

Mount Rambler, about 6 miles northwestward of the northwestern shore of the bay, is 3,600 feet in height.

Junk island, about 600 yards northward of Hutau, is rocky, 457 feet high, and on the summit is a ruined square building, which appears like a fort. The channel between the islands and that between Junk island and the main are shallow.

Split rock lies about 2½ miles southerly of the southwestern point of Kwanta island, and is a remarkable, steep, jagged, dark-brown rock, inaccessible on its southeastern side, 129 feet high at the northeastern end, and 112 feet high at the southwestern end, which is sharp. At a distance this rock appears to be split near the center, but such is not the case, as the higher portions are connected.

Small islet, 900 yards southwestward of Split rock, is small, brown, rocky, and 30 feet high. The channel between Split rock and Small islet has depths of 25 to 30 fathoms.

There is chow chow water between Small islet and Great Sanpwan island, but no sign of shoal water.

Hokin island is remarkable in appearance, and rises 726 feet. On the northern, western, and eastern sides the land rises gradually from the different points in long spurs till nearly halfway up; then it rises abruptly to the summit, the sides being rocky. On the southern side the ascent is more gradual, and southward of the summit are two peaks of less elevation.

Northward of about the middle of Hokin island and joined to it is a rock which dries 17 feet, and from it a rocky spit extends ½ mile northward, on which the least depth is 9 feet.

Little Hokin, 400 yards eastward of Hokin island, is 150 feet high. A ledge of rock extends 200 yards eastward of it.

Between Hokin island and Little Hokin there is a cluster of rocks, which dries 13 feet.

Scrag islet, a quarter of a mile southeastward of Hokin island, is small and remarkable, with 6 peaks, the highest of which is 48 feet high. Some rocks lie within 100 yards of it.

Hutau island, 1½ miles northward of Hokin island, is about 6 miles long and 3 miles broad; it is mountainous, mount Myers, in its western part, being 1,238 feet high, and mount Warren, in its northeastern part, being 1,255 feet high. Stone peak, about ½ mile southward of mount Warren, is very remarkable, rising abruptly 1,140 feet; it has a large stone on its summit. Square peak, in the southeastern part of the island, is 764 feet high, and on northerly bearings appears of a square shape. The sides of the hills are cultivated by the natives in terraces one above the other.

From East point to Rock point the coast is bold and cliffy; about half way between are some black jagged rocks under the cliffs, and ½ mile westward of them is a small indent and a remarkable cliff with a fissure.

The bay on the southern side of the eastern end of Hutau island affords shelter for boats and small junks during the northeast monsoon, but a heavy swell sets in; a rock in this bay dries 10 feet.

A rock joined to Rock point dries 15 feet; shelter for boats may be obtained under some rocks at the eastern extreme of a bay eastward of Rock point. A rock in this bay dries 9 feet.

Between Rock point and Hutau point, the southwestern end of the island, is an extensive bay which dries nearly 1 mile from its head. Bluff islet, 42 feet high, is close off the western side of the island.

White rock, 1,200 yards westward of Rock point, is peaked and stony, 138 feet high, with a small detached part on its southern side. There is good anchorage westward of White rock, mud bottom.

Overfalls.—The overfalls over the shallow banks between Hutau and Wenchau point at low water are dangerous to boats if there is any wind.

Wenchau point, the northern entrance point of the river, is 5 miles west-northwestward of Hutau point, and an isolated range of hills 412 feet high, with three distinct mounds, rises within it. The eastern mound has a ruined fort on its top. The land here is culti-

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vated in terraces. There is a small walled village at the western extreme of the range, and just outside it are three small chimneys.

A ledge of rocks, which dries 9 feet at low wafer, extends off Tent point, at nearly 1 mile westward of Wenchau point. Westward of this ledge to Mark point is an extensive mud flat where small vessels ground for a tide.

Wenchau island, just over 3 miles within Wenchau point, is 2¾ miles long, 1¾ miles broad, low, flat, highly cultivated, and surrounded by a sea wall; there are numerous villages on it. Off its western point is a small knob 108 feet high, and eastward of it, but on the island, is a table-topped green lump 99 feet high. About ½ mile eastward of this green lump is Wenchau lump, 133 feet high, which is round topped, with several red sand spots showing through the grass. These lumps are conspicuous from the river entrance.

At 100 yards southward of the detached western knob is a rock which dries 2 feet.

Wenchau island is extending, the natives reclaiming the land wherever practicable.

A soft mud flat extends 7½ miles southeastward from Wenchau island. Off its southeastern end is a sand bank ¾ mile long.

There is a small junk anchorage off Wenchau lump.

Between Wenchau island and the mainland southward there is a junk channel, and in it an extensive bank of sand and mud, which dries 16 feet at low water.

Brown hills, about 2¼ miles northwestward of Wenchau point, are a smooth, round-topped, isolated range, the summits being 596 and 510 feet high. Westward of them, and contiguous, is a range of reddish hills, the summits of which are 374 and 328 feet high.

White lump, about 2½ miles farther westward, and nearly 1 mile from the bank of the river, is 199 feet high, with several trees growing on its summit.

Inner lump, ½ mile northward of White lump, is 274 feet high, and of dark appearance, with several trees on its summit.

Rocky point, 7 miles westward of Wenchau point, is a small rocky lump, steep-to, with a white joss house on it surrounded by trees; 400 yards westward is another small lump with several trees on it.

Inside Rocky point is a large walled town, surrounded by a canal.

Between Wenchau point and Rocky point the land is low, flat, highly cultivated, with numerous villages, and fronted by a sea wall. Westward of Rocky point west lump, the land presents the same appearance, until arrested by a high range of mountains at the extreme end of which is a fort with 3 chimneys close to.

House hill, 4¾ miles northward of Rocky point, is a dark sugarloaf-shaped mountain, 1,669 feet high, with a small house on its summit.

Salamis point, on the right bank of the river and 1¾ miles southwestward of Rocky point, is steep-to, with two white forts on it. Eastward of Salamis point the land trends southeastward, and is low, flat, highly cultivated, and fronted by a sea wall. At ¾ mile inside the sea wall is Elephant range, 957 feet high. There is a remarkable knob on this range, 716 feet high. Southwestward of Elephant range there are extensive ranges of mountains.

Cone peak, 238° 3¾ miles from Salamis point, is cone topped, remarkable, and 1,547 feet high.

Between Salamis and Jar points the land is again low and flat, with two forts on it. Jar point is 241 feet high and steep-to.

Snipe and Big islands are low, flat, and highly cultivated, interspersed with numerous trees and houses, and surrounded by a sea wall. These islands are extending by reclamation.

A shoal extends between Rocky point and Snipe island toward the right bank of the river, and it narrows the channel to 300 yards.

Snipe island or Lower anchorage.—The village, where there is a custom-house and flagstaff, stands on the right bank of the river above Jar point, and the land from Jar point is low, flat, and highly cultivated, with numerous houses, and generally fronted by a sea wall. This highly cultivated land extends 1 to 3 miles southward, when it is terminated by mountain ranges. There are two forts at the village, and a canal connecting the village with Wenchau fu.

Vessels anchor off the custom-house; it is advisable to moor.

Wenchau river—Directions.—Lieut. Commander A. W. Grant, U. S. Navy, commanding the U. S. S. *Frolic*, gives the following directions for the Wenchau river in 1904:

Left White rock going up river during the first hour of flood tide. The least sounding obtained by the lead at a speed of 10 knots through the water between Hutau point and Wenchau point was 3½ fathoms. From Wenchau point steer a course following the northern shore from 300 to 800 yards distant until north of the eastern end of Wenchau island; then keep midway until between Knob point and Rocky point (walled town); then steer 223° with Salamis point open on the starboard bow, until within a mile of it, when you will begin to follow the southern (right) bank of the river, keeping within 300 yards until south of Snipe island (beyond the lower maritime custom-house). From this lower anchorage to Wenchau fu the land from the banks of the river to the base of the mountains is very low in all directions, and as there are no landmarks on the river banks to steer for, one must have a pilot from there to Wenchau fu. In general, however, after passing Jar point steer for the southwest shore of Snipe island, leaving the latter open on the starboard bow, and continue the course until it carries you past Snipe island and across the river to an island on the west or right-hand bank; then follow this bank until you make out the joss house on the point on the northern bank of the river on your port bow. Cross the river to a point ½ mile 99° of the point and follow the shore until about ½ mile west of the point (two pagodas on island in line); then head 223° until you cross the river, following the bank to an anchorage about 22 feet at low water abreast of the custom-house.

Directions.—When passing seaward of Tong hwang island guard against an indraft into the river with the flood.

Considerable alterations having taken place since the last survey, no reliable directions can now be given for the navigation of the channels.

Ou kiang (Ngau kiang) (Wenchau river) is about 30 miles in length from sea to Wenchau fu, whence the distance to its source at Hungchuen city is 150 miles. Its general direction from Wenchau fu to Kuchofu, a distance of about 60 miles, is northwestward; thence to its source southwestward.

Fishing stakes abound in the river, and are more numerous in August and September than at other times; some of them are large enough to injure the propeller of a steam vessel, but the majority are harmless.

Navigability.—The Ou kiang is navigable by vessels of 14 feet draft at low-water spring tides as far as Snipe island. The tidal range is, however, sufficient in this river to accommodate steam vessels of deep draft at half flood.

The river is navigable for junks with a carrying capacity of about 20 tons as far as Wenchi, which is 30 miles above Wenchau fu.

Caution.—Considerable change has taken place in the river since the survey was made in 1878, and B. A. chart No. 1763 is reported to be no guide for the channels.

Pilots can not be obtained at Wenchau; by previous application to the consul, a Chinaman can be procured to meet a ship, or a pilot can be obtained at Ningpo.

The services of a boatman can be obtained at Snipe island anchorage, but he will not be responsible for the safety of the ship.

Wenchau fu was founded and its walls built about 374 A. D., tradition asserting that the site was chosen on four hills because of a superstition connecting these with four stars in the constellation Ursæ Majoris. Wenchau fu is a treaty port and prefectural city and the prefect has jurisdiction over six other cities of the second and third class.

Wenchau was connected by telegraph with the rest of China in 1902. The population of the city is estimated at 170,000.

Pagoda island, or Ku hsu, commonly called Kiang sin sze, lies about 400 yards off Wenchau fu.

Beacon.—An iron mast painted red, surmounted by a basket 6 feet in diameter painted red with a white band, is placed on Elephant rock, or Hsiang shih, which is 8 feet below high-water springs and situated 200 yards southeastward of the eastern end of Pagoda island.

A rock with 1 foot water over it at low water lies about 100 feet westward of the beacon.

Anchorage.—The bottom of the Ou kiang is chiefly mud and sand, the banks being hard sand. The holding ground is good at all the anchorages. At Wenchau fu, as the drains into the river are at the eastern part of that city, anchor westward of the customs flagstaff.

Supplies.—Fresh water can be obtained at Two Pagoda point. Fish, fowls, eggs, geese, beef, and pork may be procured at moderate prices; the meat is of inferior quality; bread requires 3 days' notice; vegetables and fruit are cheap and plentiful, and consist of pumpkins, potatoes, yams, watermelons, grapes, and pineapples. Firewood can be bought.

Winds.—Sea breezes blow regularly in the river during the summer; they are generally felt at the city between 2 and 4 p. m. Thunderstorms are frequent at this season and occur between 4 and 8 p. m., working round from the northern hills, crossing the river, and returning. Mirage is common in the river. Typhoons are frequent.

Typhoon anchorages.—Bullock harbor, the anchorages westward of Tong hwang island, and that southward of Hokin, afford fair shelter.

Trade.—The chief exports are tea, oranges, medicines, timber, umbrellas, and wood poles; the imports are opium, cottons, yarn, woolens, iron, kerosene oil, sugar, rice, silk goods, and tobacco.

In 1905 the value of the imports amounted to $1,134,355 and of the exports to $548,320.

In the same year the number of vessels entered at the port was 51, with an aggregate tonnage of 23,267 tons.

The diseases of Wenchau fu are cholera, ague, ophthalmia, and smallpox. Cases of opium poisoning are frequent, elephantiasis exists, and leprosy is rare. These diseases are confined to the native population, and the city may be considered generally healthy for a Chinese town. The most healthy time of the year is from December to February, inclusive, and the most unhealthy June and July.

Quarantine.—The medical officer of customs reports any suspected vessel, and the pilot is ordered to anchor such vessels 1 mile below the shipping at the lower anchorage.

Great Sanpwan island, lying 1 mile southeastward of Hokin island, is 3¾ miles in length northeast and southwest, and of irregular breadth. It is low at its southwestern end and gradually rises to the Paps, two mounds at the summit close together, which are 771 feet high and conspicuous on easterly or westerly bearings. Northeastward of the Paps the land is hilly, with numerous smooth-topped hills.

There are two islets, joined by a reef, between Miau and Great Sanpwan islands. The western is connected with Miau by a ledge of rocks and sand. There is a channel between the eastern and Great Sanpwan island, which is used by boats and small junks, but a bank to the northward precludes its use by larger craft. A ledge of rocks extends about 100 yards southward of the eastern islet.

Twin rocks, about 1¼ miles north-northeastward of the southwestern point of Great Sanpwan island, are two rocks 300 yards northeast and southwest of each other, which dry 5 feet at low-water springs.

Middle island, which is separated from the southeastern point of Great Sanpwan island by a channel 300 yards wide, with some rocks in it, is 309 feet high, with a remarkable steep cliff on its northeastern side and a conspicuous mound on its summit. There is a small detached rock, 42 feet high, off its southeastern side and a small sandy bay on its southern face.

Steep rock, west-southwestward of Middle island, is connected with it by a rocky ledge, and is 101 feet high; ¼ mile southwestward is a rocky ledge which dries 10 feet at low water.

Heron rock, with 10 feet water over it, lies 240 yards southward of the detached rock, 42 feet high, off the southeastern side of Middle island. The bottom between Heron rock and Middle island is uneven. The whole of this locality was carefully examined in 1902.

Clearing mark.—The central summit of Camp rocks in line with the highest summit of Tong hwang island, bearing 210°, just clears Heron rock in 10 fathoms. Vessels in the vicinty of the rock must keep eastward of this line.

Little Sanpwan island, on the northern side of the eastern part of Tong hwang island, is 1¾ miles in length east-northeast and west-southwest, ¾ of a mile in width, and is hilly, attaining a height of 286 feet. Off its northeastern and northwestern points there are rocky ledges, the latter of which dries 16 feet and is steep-to. During the southwest monsoon there is good anchorage on its northern side. There is a narrow boat channel between it and Tong hwang with a rock 40 feet high in the center.

Fishing stakes extend off the northern side of Little Sanpwan island toward the channel, and they are not always visible at high water.

Camp rocks, 600 yards westward of the southwestern end of Little Sanpwan island, are a cluster of rocks 32 feet high, with a rocky ledge westward of the rocks. Southward of Camp rocks is an islet 38 feet high.

A vessel drawing 13 feet can take Sanpwan pass at low-water spring tides, and a vessel drawing 16 feet can take it at neaps.

Tides and tidal streams.—It is high water, full and change, at Camp rocks at 9h. 16m.; springs rise 20 feet, neaps 15 feet. The flood stream sets in at both ends of Sanpwan pass; its duration is 5¼ hours and its greatest rate 1¾ knots. The ebb runs out at both ends; its duration is 7¼ hours and its rate 1½ to 2 knots. The flood stream off the eastern entrance to the pass sets rather northward.

Tonghwang, the largest island of the Tonghwang group, is about 1 mile south of Sanpwan island and is 6 miles in length, east-northeast and west-southwest, 2¾ miles in greatest breadth, and 730 feet high; its eastern side is high and precipitous; there is a junk channel between it and Pwanpin, the small island to the southward.

Coin island is the eastern of the Tongwang group, and lies about 3½ miles eastward of Tonghwang island; there are 3 rocks above water within about 1,200 yards northwestward of it.

Sylvia rock, with 2¾ fathoms over it at low-water springs, lies 209°, 2$\frac{3}{10}$ miles from the summit of Coin island.

Flask island, 1¾ miles eastward of the southeastern part of Tonghwang island, is low and flat; rocks above water extend ½ mile southward of its western end, and 328° from that end at distances of ½ mile and 1¼ miles are 2 rocky islets. At ¼ mile southeastward of the northwestern of these 2 islets is a shoal with a depth of 3¾ fathoms over it at low water.

Mosquito rock, 16°, 1,400 yards from the northwestern of the 2 rocky islets, bearing 328° from Flask island, is a pinnacle with 4 feet over it at low-water springs and 7 to 8 fathoms around. Between this rock and the rocky islet the ground is foul and the soundings are irregular in the vicinity.

Takiu island, the southwestern of this group, is 786 feet high, and cliffy, except on its northwestern side; there are depths of less than 2 fathoms for ¾ mile northwestward of the island.

Cutting island, 1 mile northward of Takiu, is 190 feet high, and Snell island, ½ mile farther northward, is 217 feet high.

Tseigh islands, 3 in number, are about 2 miles southeastward of Takiu and 8 miles north-northwestward of Pikishan, in which space there are clusters of rocks interspersed with reefs covered at half tide. Between Tseigh islands and Pwanpin island, the next island northward, is a navigable channel ½ mile wide.

Stoney islet, ¼ mile westward of Hwang point, the western end of Tonghwang island, is a cluster of large stones 21 feet high; some rocks, which dry 3 feet, lie off its southwestern end.

Bullock harbor, the entrance to which is between the Tseigh group and Takiu island, has excellent anchorage in 4 to 10 fathoms, sheltered, except from winds between about south and southwest, which bring in a heavy swell.

Leading mark.—A good leading mark when approaching Bullock harbor from the eastward is North islet (north of Takiu), seen between the islets off the south point of Pwanpin island, bearing 278°.

A more sheltered anchorage for 1 steam vessel is northwestward of Snell island, or westward of Stoney islet (at the southern entrance of the Sanpwan pass).

Supplies.—Water fowls and eggs can be obtained; bullocks are also procurable, but they are not plentiful nor large.

Tides and tidal streams.—It is high water, full and change, in Bullock harbor at 9h. 30m.; spring rise 19 feet, neaps 14½ feet. Southward of Bullock harbor the ebb stream appears to set toward Takiu, and the flood toward the south point of Miau.

The flood stream sets westward through the channels northward of Takiu island at a rate of 1 knot, and the ebb eastward at a rate of 1½ knots; flood and ebb are each about 6¼ hours in duration.

Miau island, about 1¾ miles west-northwestward of Tonghwang and 4¼ miles southward of Hutau point, is 4 miles long, 1½ miles broad, and rises to the height of 1,082 feet. There is a remarkable bowlder on the summit of a hill 855 feet high, 1,400 yards westward of Miau summit. Cat point, the southern end of Miau island, rises to a mound, 550 feet high, which is joined to Miau by low land. The southeastern point of Miau is also a mound, 257 feet high.

Two islets, the smaller of which is Hwangchau and the larger Seaunesesan, are situated about ¾ mile and 1 mile westward of Cat point. Seaunesesan is 98 feet high, table-topped, with a slight rise at its eastern end. A cluster of rocks, awash at high water, lies 400 yards southwestward of it. Dick islet, situated northward of Miau island, is a small peaked rock, 43 feet high.

Pang peto reef, visible at low water, lies with Seaunesesan bearing about 60°, distant 3½ miles.

Taepi islands, lying 10 miles southwestward of Takiu island, afford sheltered anchorage with smooth water in the northeast monsoon on their southern side in 4 fathoms.

Tungpwan islands, a group of 1 island and 4 islets, are situated about 3 miles eastward of Taepi island. Tungpwan island has anchorage off its southwestern side in 8 fathoms in the northeast monsoon.

Shroud islet, 4 miles eastward of Tungpwan, has a noticeable bluff; the rocks near it are low, and a sunken rock lies northward of the rocks immediately westward of Shroud. An islet with a reef northward of it lies 340° 2½ miles from Shroud islet.

A reef is reported to extend some distance southeastward of Shroud islet.

Light.—A group flashing white light showing 1 group of 5 flashes every 20 seconds; duration of each flash ¾ second; eclipse between flashes 2 seconds, eclipse between groups 8¼ seconds; is exhibited from a white steel tower 26 feet above the ground and 233 feet above high water, and located on the western extremity of Shroud island.

The light is visible 21 miles over the whole horizon.

Pikishan islands, a group, the largest island of which is 351 feet high and named Pikishan, lie 7 miles eastward of Shroud islet. An islet, surrounded by rocks, lies 1¾ miles westward of the western Pikishan island. Fresh water may be obtained.

Tidal streams.—On the southwestern side of the Pikishan islands the ebb stream sets south-southeastward and the flood northwestward.

Namki islands lie about 10 miles southwestward of Pikishan, and on the southeastern side of the largest island, which is 740 feet high, is port Namki. There are many reefs which cover at high water among the islets in the southwestern part of this group, and navigation should not be attempted in this vicinity. Turret islet, the western of the group, makes like a cone and there are reefs northward and westward of it. Water can be obtained in port Namki.

Anchorages.—In the northeast monsoon and with southeasterly winds a swell rolls into port Namki. A bay on the northern side of the west point of Namki is a good, smooth-water anchorage and frequented by junks.

Castellated rock lies about 6 miles southwestward of Namki; appears as two islets.

Coast.—From the southern side of the mouth of the Ou kiang the coast trends south-southwestward to the entrance to Shwingan river, a distance of 17 miles, and thence to Pingyang point, a distance of 11 miles in the same direction. It is fronted by mud banks, the outer edge of which trends south-southwestward. These banks dry 3 miles from the land at low water, and on them are several small islets and rocks 5 or 6 miles off the shore.

The bar at the entrance of the Shwingan has only 9 feet on it at low water, and off it are the four Tsang islets, the southern of which is the largest. In the channel between this latter islet and the mud bank at the entrance of the river the depth is only 9 feet.

The coast from Ping yang point, to Kwan head, on the north side of Pi pass, trends south-southwestward for 17¾ miles, and at the distance of 8 to 11 miles is Tanue bay, which is shallow, with general depths of less than 2 fathoms. Pikwan peak, a remarkable, high, sharp, conical hill, is situated 6 miles westward of the southern entrance point of Tanue bay. Gap islet, a low rock, lies 1½ miles southward of Tanue point, and Farmer rock, which shows at low water, lies 60° 4 miles from that point.

Pingfong island lies about 1½ miles southerly of Kwan head, has at about ¾ mile off its southeastern point a rock above water, and between this rock and the island is a sunken rock. From the northward pass eastward of this rock above water, and then haul up for the southern point of Pingfong, giving it and also the southwestern point a berth of 400 yards. Pi pass, between the northern end of Pingfong and the main, is very narrow, with several rocks in it, and has not been surveyed.

A shoal, with probably 12 to 14 feet on it at low water, lies with the western extreme of Pingfong island bearing about 2°, distant 1 mile; approximate position, Lat. 27° 08′ 30″ N., Long. 120° 30′ 30″ E.

The shoal is marked by a red buoy, which, however, should not be relied on.

Fresh water can be procured at Pingfong.

Chinkwan island lies about 1½ miles westward of Pingfong island. A reef extends 200 yards from the south point of the island, and also nearly 300 yards from the islet on its southwestern side. There is anchorage in 9 to 7 fathoms off the western side of Chinkwan northward of the second islet from its southern end.

Pikwan harbor lies between Chinkwan island and Pingfong island, which is about 1½ miles to the eastward, the mainland forming its northern side.

The harbor has a depth of 3 fathoms, and affords good shelter in the northeast monsoon to vessels under 15 feet draft.

Namkwan bay extends about 3 miles northward from between Namkwan point, 1½ miles to the westward of Chinkwan island and the northern part of Chinkwan island; the water shoals suddenly on entering the bay, which is very shallow. The walled town Namkwan stands on its northern shore.

Namkwan harbor.—Fuhkien head lies about 2 miles eastward of the head of Chinkwan island; and 1,600 yards northward of the head is Namkwan point, the southeastern point of a peninsula about 3 miles in length. Between Fuhkien head and Namkwan point is the entrance to Namkwan harbor, an inlet which runs about 15 miles in a general northwesterly direction, when it appears to expand into a wide basin called "Gordon bay."

Town point is 1¼ miles westward of Namkwan point; within it is a town. Southward of Town point is a small rock above water, and close westward of the point is Bate islet, from which a rocky reef, which shows till quarter flood, extends northwestward 400 yards. The mud banks off the shore northward of Town point are very steep. On the southern side of the entrance is a small fort with a few houses. The narrowest part of the channel is 1,200 yards wide, and the tidal streams are strong and the winds baffling. The channel within the entrance is narrow, tortuous, and surrounded by high hills. There is anchorage northwestward of Bate islet in 14 fathoms.

A shoal lies eastward of Kinsho island, which is about 4 miles within Bate islet, and a rock, dry at low water, is situated 100 yards southward of the western extreme of the island.

Nimrod rock, with 9 feet water on it, lies about 11 miles within the entrance, and 350 yards eastward of a shall islet on the western shore of the harbor.

The chart is the only guide.

Fishing nets.—There is a large number of fishing nets in the entrance to this harbor, and as far up as Tree island.

Tides.—It is high water, full and change, in Namkwan harbor at 10h. 0m., and springs rise 17 feet. The streams are very strong, and eddies off nearly all the points.

Coast.—From Fuhkien head to Mortice bluff, a distance of about 3 miles southerly there are two small, deep bays, but only partially surveyed; from Mortice bluff the coast turns westward with high bluffs for about 7 miles to Tchinkoen bay, which is unexplored; it then turns sharply to the southward to Lishan bay, a distance of about 7 miles.

Lishan bay, a good roadstead, the anchorage in which is on the Fuyan side, abreast an islet and a joss house, protected from westerly and southerly winds. Water is plentiful and easily obtained at the anchorage.

Tides and tidal streams.—It is high water, full and change, in Lishan bay at 10h. 15m.; springs rise 16 feet. The first of the flood stream runs west-northwestward ¾ knot, then west-southwestward at ½ knot; the ebb runs northeastward ¾ knot.

Fuyan islands.—Immediately eastward of the small stretch of coast southward of Lishan bay are the Fuyan islands, which extend eastward for about 8 miles, comprising Angle, Chupi, and Fuyan islands.

Little pass, between Angle island and the main, is narrow but good, and not less than 3 fathoms deep. In the southern part of this pass there is capital typhoon anchorage for one vessel in 9 fathoms.

Chupi pass, between Chupi and Angle island, is 1,600 yards across, but there is a patch of low rocks southeastward of Angle island that narrows the channel to half a mile, and must be left to the westward. There is a sunken rock off the northeastern point of that island.

Fuyan island is 1,700 feet high and the largest of the group.

Shoal.—Depths of 7 fathoms were obtained by H. B. M. S. *Alacrity* in 1906 at a distance of about 3 miles to the southeastward of Fuyan island.

Fuyan pass, between Fuyan and Chupi islands, is narrow and deep. Very strong gusts of wind from the high land and strong eddies render this pass less desirable than either of the others, and sailing vessels using it are apt to get becalmed under Fuyan.

Dangerous rock, 119° 9½ miles from the eastern extreme of Fuyan island, is 8 feet above high water, or 24 feet above low-water springs.

Incog islands are a group of islets and rocks extending 2 miles northwest and southeast, and about 1 mile northeast and southwest. The eastern and largest islet lies 64° 5¾ miles from the eastern extreme of Fuyan and is 150 feet high. On the southwestern side of the western islet and about 400 yards from it there is good shelter in the northeast monsoon in 6 fathoms, mud.

Light.—A group flashing white light, showing 1 group of 2 flashes every 20 seconds, exhibited on the western extremity of the westernmost island of the Incog group.

The light is exhibited 149 feet above high water from a steel tower 61 feet high and is visible 18 miles. The light is obscured on various bearings by the eastern islands of the Incog group between the bearings 250° and 318°.

The tower and dwellings are painted white.

Solitary rock, 316° 3½ miles from the western Incog islet, is 200 feet high, and a reef extends 400 yards eastward from it. The channel between Solitary rock and the Incog islands is safe.

Tae islands are two islands and some rocks lying about 11 miles eastward of the Incog islands. The eastern and largest island is about 400 feet high and remarkable for its table top. There is shelter in the northeast monsoon under this island as close in as a vessel can safely go, but it is very bad. Mushroom rock, 260 feet high, is close northeastward of the northern Tae island.

A reef awash at low water lies 303° 4¼ miles from the northwestern point of the northern Tae island, and two reefs lie 264° at about 1 mile and 2 miles from the same point. Strawstack islets, two rocky islets each about 300 feet high and close together, lie 204° 2¾ miles from the eastern Tae island.

A rock, awash at low water, has been reported to lie about 4½ miles westward of Strawstack; its position is doubtful.

Caution.—If passing inside Tae islands, keep well to the westward, as the ground in their vicinity has not been surveyed.

Seven stars are a group of islets and rocks; the southern and largest islet lies 71° 7 miles from Mushroom rock and is about 200 feet high and split into two. A rugged islet, 70 feet high, lies 1 mile northeastward of the largest islet, and 1 mile farther northeastward are three low, flat rocks, the eastern of which covers. Sunken rocks lie approximately 319° 1,600 yards and 296° 1 mile from the 70-foot islet.

Cleft rock, 50 feet high, lies 336° 3 miles from the largest islet.

Funing bay.—From Little pass the coast falls back westward, forming a shallow bay, on the northwestern shore of which is the city of Funing fu. In its northern part a group of islets extends 2 miles from the mainland; Fong ho, the southeastern and largest islet, affords anchorage under it, but the shelter is not good. There is a narrow passage between the rocks northward of Fong ho and those off the mainland.

Fielon island, which is almost connected to the mainland, lies at the southern entrance to Funing bay; the coast between forms a bay, with shoal water and numerous rocks in it.

Goodridge point is about 4½ miles to the southward of Fielon island, the coast between forming a bay, and 4½ miles farther south is Stone point, the coast between forming another bay, in which is Bittern island and several rugged rocks, which should not be approached to less than 6 fathoms. Two of these rocks lie about ½ mile southeastward of the southern extreme of Goodridge point. Bittern island is from 3 to 4 miles in circuit, and between it and the mainland there is a passage about 800 yards wide and 1 mile in length, affording good anchorage in 3½ fathoms for small vessels in either monsoon. On the mainland northwestward of the island is a sandy cove, where there is good fresh water.

Piseang (Tsising) islands are a group of islets and rocks extending about 5 miles north and south and a similar distance east and west; lie about 13 miles southerly from Fuyan island.

Town island is the northern and largest, and the little cove in its southwestern side affords shelter to one or two small vessels.

The eastern islet is about 2 miles southeastward of Town island; a reef, on which the sea breaks and which has a rock drying 6 feet on it, extends ½ mile northeastward of this islet. Country islet, the southeastern islet, is about 400 feet high.

Between the northern and southern islets of the group there is a channel free from rocks, but the intervening space is thickly studded with fishing stakes.

The coast from Stone point to the point northwestward of Flat island trends 235°, 3 miles.

Flat island lies ½ mile off the coast; it is low and flat, with a rock above water having a sunken rock 100 yards southward of it, close off its southwestern side. An islet lies in the passage between Flat island and the main, which is not fit for navigation.

Double Peak island, 2 miles southeastward of Flat island, is 3¼ miles long north-northeast and south-southwest, and near its northern end are two remarkable peaks, the higher of which rises 1,190 feet above the sea. A rock above water lies ¼ mile off a point ½ mile northeastward of the western point of the island, and there is a sunken rock midway between the rock and point. A rock above water lies 200 yards off the western point of the island, and ¾ mile northwestward of that point is an islet with a rock above water close eastward and westward of it.

Shoal water extends ½ mile southwestward of the island, and the channel between Spider and Double Peak islands is clear except for this shoal and the rocks northeastward of Spider island.

Two cone-shaped islets lie southward of Double Peak island, with narrow channels between.

Anchorages.—There is good anchorage in the northeast monsoon southwestward of Double Peak island, the two islets southward of that island sheltering from the easterly swell.

There is good shelter abreast the sandy bay about 1½ miles westward of Flat island.

Seaon channel between this coast and Flat island, on the north, and Double Peak island and the rocks northwestward of it on the south, is deep and clear.

Spider island, about 4 miles southwestward of Double Peak, rises 620 feet above the sea; there is a large village in a bay on its southern side. A reef lies off its southwestern point and four small islets off its northeastern side, which are reported to be incorrectly charted.

Westward of Spider are the Larva rocks, forming two groups, with a channel between them; two rocks on each group are above water. Some rocks awash, and one 10 feet high, lie about ½ mile northward of the central Larva rock.

Northwestward of Spider and between it and Cox point, on the main, which is 5½ miles distant, there are three islets; between the first and Spider island is Half-tide rock; the center one, Isthmus island, has a sandy isthmus, and a mud bank extends from it, but the channel between it and the first islet, at 1¼ miles southeastward, is clear.

The passage between Isthmus and Inside islet, 1¼ miles westward, is obstructed by a reef, some rocks of which uncover at half ebb, and which extend ¾ mile eastward of Inside islet. The channel between Inside islet and Cox point has 6 to 4 fathoms and is 1 mile wide.

The channel between Isthmus and Larva is contracted to about 1 mile by reefs.

There is good shelter from northeast winds on the southwestern side of Spider island.

Tides.—It is high water, full and change, at Spider island at 10h. 0m.; springs rise 17 feet.

Light.—An intermittent white light every 15 seconds—thus, light 13 seconds, eclipsed 2 seconds, is established on the easternmost islet off the northeastern end of Spider island.

The light is exhibited 142 feet above high water from an iron tower 53 feet high with dwelling attached, the whole painted white, and visible 17 miles.

Cony island lies 3¼ miles eastward of Spider island; is a remarkable, conical island 742 feet high; a reef extends 600 yards off its northeastern side, otherwise the channel, 1½ miles wide, between it and the island northward of it, is clear. A rock awash at low water lies 1 mile eastward of the cone; a similar rock lies 131° 1½ miles from the cone, and uneven ground extends about ¾ mile westward and southwestward of this rock.

In 1902 H. B. M. S. *Waterwitch* passed over the position of a 6½-fathom shoal, marked on the chart at 2 miles westward of Cony island, but no indications of it were observed.

Tidal stream.—The rate of the ebb tidal stream off Cony island averages 1½ knots.

Coast.—From the point northwestward of Flat island to Chown point the coast trends southwesterly for a distance of about 13 miles; it is imperfectly surveyed and should be approached with caution.

From Chown point to Castle point, the eastern entrance point to Samsa inlet, about 3 miles west-northwestward, is rugged, and steep-to. The tidal streams are not much felt close to it.

Samsa inlet.—The entrance to this inlet, at 10 miles westward of Spider island, is 1½ miles wide; the water is deep and the tidal streams strong. The inlet within the entrance opens into an inland sea extending some 25 miles east and west, and 15 miles north and south, with numerous islands in it, and it is much occupied by mud flats, especially at its western portion.

Two rivers flow into it from the northward, the western of which leads to the town Fuhduk, and the eastern to the village Siengdieng, the seaport of the city Funing fu, which lies about 8 miles eastward of it and overlooks Funing bay.

The principal town in the inlet is Nintai, a walled town situated at its western end. The country around the inlet is well cultivated, and the hills are terraced; the soil is very fertile.

Tea is the chief export from the inlet, and it is conveyed overland by carriers to Fuchau. The opening of the inlet to shipping has not as yet diverted the land transport. Rice, sugar cane, sweet potatoes, vegetables, etc., are largely grown, but the supply appears scarcely sufficient for the requirements of the natives.

Santu is the most important island in the inlet, and on its western end is a Chinese imperial custom-house. There are several stations of the Church Missionary Society round Samsa basin.

Anchorages.—The principal anchorage is southward of Santu off the custom-house, but there is anchorage in most parts of the inlet with the exceptions of the channels in which the tidal streams are very rapid.

Approach.—Samsa inlet is easy of access in all weathers, but with strong northeasterly winds a heavy sea rolls in through the entrance, and with the ebb stream running there is a heavy rip.

Fishing nets.—Numbers of large nets, visible only by the bamboos which support them, are placed in this inlet and its approaches. A close lookout should be kept for them.

The shore of the inlet from Steep point trends north-northwestward for 4 miles to Dengo (Town bay). It is rugged with deep indentations, which are principally filled with mud flats. A swell always sets in on this shore even in the calmest weather.

Dengo (Town bay) is shallow, $\frac{3}{4}$ mile broad, and extends $1\frac{1}{2}$ miles northwestward. At low water springs all the bay is a mud flat. There is a village in its southwestern corner, where a stream discharges.

Town point is a bluff, steep-to, and the peninsula, of which it is the termination, rises at 2 miles northwestward to mount Davy, 1,210 feet high.

Channel rock, the only danger in the entrance, lies 150° $1\frac{7}{10}$ miles from Town point; it is steep-to, dries 14 feet, and may be passed on either side.

An iron beacon, surmounted by a spherical cage, 12 feet above high water, has been erected on Channel rock.

Hail point, the western point of Cone island, in line with the western summit of Chingsan (Crag island), 336°, leads midway, between it and Castle point, 1,200 yards to the eastward.

Cone island, about 1 mile northeastward of Town point, is 577 feet high and of a rugged appearance. At 300 yards southward of its southern point are the Steeple rocks, 60 feet high, and about 300 yards farther southward are 2 patches of rocks which are completely submerged and unmarked either by breakers or eddies and have deep water around them.

Hail point is the western point of the island and at 150 yards northward of it is a rock just above low water springs, and 600 yards northeastward are some patches of rocks 1 of which, 6 feet high, shows white.

The channel between Cone island and the mainland to the westward is 1,200 yards broad, with a depth reaching 67 fathoms. The rate of the tidal streams in this channel is 6 to 7 knots at springs, and there are rips and swirls off Hail point.

The shore from Town point trends northwestward in irregular outline for 5 miles to abreast Diver islet; it is much broken up in deep bights filled with mud flats; all the prominent points are steep-to.

Chingsan (Crag island) is about 1,400 yards northeastward of this shore; it is 3 miles long, east and west, 1 mile broad, and attains a height of 1,265 feet. Nguuong, an island about ½ mile across and 238 feet high, lies southward of the eastern part of Chingsan, from which it is separated by a channel 700 yards wide, where there is anchorage for junks. A rock, 105 feet high, lies 600 yards northeastward of Nguuong, on the edge of the shoal water extending from that island.

Waterwitch channel, between Chingsan and the main, is clear with the exception of Vivian rock, which has 9 feet water over it and lies 121° 450 yards from the southern point of Chingsan. The channel narrows to 700 yards between Diver islet and the rocky ledges extending from Pillar rocks.

Pillar rocks are granite bowlders 20 feet high, situated 201° 900 yards from the northwestern point of Chingsan. A ledge of flat rocks extends 200 yards southwestward from them, and its extreme dries only at low water springs. The tidal streams are rapid past this ledge; the ebb sets toward Diver islet; there are also tide rips and swirls.

Caution.—Fishing boats with their nets almost block up Waterwitch channel at times. The nets are moored by heavy baskets of stones, and the net poles show in clusters some feet above the water; these should be avoided, as the mooring ropes are strong and would bring up a ship's propeller.

Diver islet, the eastern of a group of islets extending ½ mile from the mainland, is 35 feet high. Two hundred yards northwestward of it is a cluster of rocks awash at high water springs; the center rock of the cluster is painted white.

Kaiser rock lies 333° 1,100 yards from the summit of Diver islet, is a sharp-edged rock about 30 feet long, awash at very low springs, and steep-to. A white mark on the summit of Diver islet in line with the white painted rock of the cluster northwestward of it leads to Kaiser rock.

The tidal streams eddy around it and are rapid.

Buoy.—At 200 yards north-northwestward of the rock is a black can buoy.

Leading mark.—The southwestern point of Chingsan in line with the northeastern point of Cone island leads about 400 yards northeastward of the rock and 300 yards of the buoy.

The shore from abreast Diver islet trends westward for 4 miles to Apex point, the northwestern point of a bluff, the summit of which is 878 feet high. At the back of this bluff a creek runs west-southwestward for ¾ mile, and at its head is a small river which is fed from a waterfall 300 feet in height.

From Apex point the shore trends southwestward, and at the distance of 1½ miles from it is Wanyao village, where there are extensive potteries; 2 miles farther along is Feloon village, on the side of a creek, the head of which is filled with mangroves. Nedu town is on the shore 2 miles northwestward of Feloon. Mud flats extend from 1 to 1½ miles off this shore.

Santu is the most important island in Samsa inlet; King point, its southwestern extreme, lies 1$\frac{2}{10}$ miles north-northwestward of Apex point, whence the island extends 5¾ miles east-northeastward. The island at about 1½ miles from its eastern extreme is nearly divided by a deep bight in its northern side, and the eastern part is 926 feet high. The summit of the island, mount MacAllum, is in its northwestern part and is 1,476 feet high; mount Stevens, in the southern part of the island, is 1,205 feet high and a conspicuous summit. The island is wooded and well cultivated.

Elbow islet, 40 feet high, lies 800 yards northwestward of the northern point of the eastern part of the island. Santu bank extends off Santu island from its western point to Elbow islet northward nearly to Bold point.

Sampan islet, 40 feet high, lies 400 yards off the west coast of the island at 336° 1,800 yards from King point.

There is a Chinese imperial custom-house on Customs point, at about 800 yards westward of King point, and there are dwelling houses for the officials and a stone jetty and pier near it.

Anchorage.—A telegraph cable crosses the anchorage from the western side of the jetty at Customs point to Apex point, on the southern shore.

Trade.—In 1905 the number of vessels entered was 120, with an aggregate tonnage of 32,878 tons. The trade at Santu is steadily increasing.

Communication.—There is telegraphic communication between Santu and Fuchau.

Lay rock, 350 yards southward of the stone jetty, is a rounded bowlder, 3 feet high, steep-to on its southern side; rugged rocks extend northward about 150 yards from it, which cover about 1½ hours before high water, and at low water the whole appears like a small island.

Mud flats extend 1¼ miles southeastward of the eastern part of Santu.

Granville channel, between these mud flats and Chingsan, has least depths in the fairway of about 15 feet; it should only be used for navigation at high water.

Santu anchorage.—The best anchorage is with Sampan islet in line with King point and Customs point in line with mount Stevens, in 7 to 10 fathoms. This position is clear of the bank westward of Lay rock, which extends approximately ½ mile southeastward of King point, and over which there are strong tide rips with the ebb at springs. At this anchorage the tidal streams attain a rate of 3½ knots.

Olive island, 600 yards long east and west, 200 yards wide, and 124 feet high, lies 1 mile westward of Customs point, and is on the southeastern corner of Sheldrake flats; a reef of rocks extends 100 yards northeastward of it. The island is cultivated.

Nintai, a walled town situated 7 miles westward of Santu, is approached by two channels—Pagoda creek to the southward and Nintai channel to the northward—which are only navigable by boats 1 hour after low water. Nintai channel is the broadest and deepest and is used by junks, which always ground off the city.

Pagoda island, about 1 mile eastward of Nintai, is 342 feet high; and on its summit is a pagoda 60 feet high; two small islets lie northwestward of it. There is a causeway between the main and the southern side of Pagoda island, with the remains of old gates, and on the northern side of the island are the remains of a causeway curving northward; the area inclosed was once a basin for shipping, but it is now filled up with mud.

Hump islands, 1 mile southeastward of Pagoda island, are two in number, and almost block up the bay, at the head of which is Nintai town; they stand on the same extensive mud flat as Pagoda island, and from them the Tongue mud flat extends 3 miles eastward. Oysters are cultivated on this flat.

Spider island, on the northern side of Nintai channel, is an irregular shaped island, its summit reaching a height of 460 feet. There is extensive cultivation around it, which is inclosed by walls, and there are many villages on the island, the largest of which are Tungwan and Parquan.

Grieve island, immediately northward of Spider island, is 3¾ miles long east and west, about 1¼ miles broad, and it rises near its southwestern end to a sharp peak 1,040 feet high. Two small islets lie off its eastern end, southward of the eastern of which at ¾ mile and 1½ miles are the two Hecla islands.

Sheldrake flats extend off Spider and Grieve islands, Olive island and Hecla islands being on their eastern edge. There are several islands on the flats, and two gutters, separated by Flat island, which is about 242 feet high, lead to Tungwan and Parquan.

Bold point, 800 yards northeastward of the northeastern end of the Hecla islands, is steep-to. From this point the shore trends southeastward 2¼ miles to Esk point and then eastward 1½ miles to Ford point.

A channel passing close to Bold point leads northward of Grieve island to the shallow bay to the westward. Pasiusan almost blocks the head of the bay, but leaves passages for boats on either side to a shallow river northwestward of the island. This locality has only been partially examined.

Somerville channel, narrow and deep, runs close along the shore between Bold and Esk points, thence trending across to the northward of Elbow islet.

Weigall channel.—Tay point is 1½ miles northward of Ford point, and Weigall channel, 800 yards wide, leads between Thames and Tay points into the river, running some 25 miles inland to the town of Fuhduk.

The channel is deep, but the water shoals quickly within the narrows; the deepest water then is along the eastern mud flat.

Thames point, the southern end of the Pinnacle range, has a rock or islet westward of it. A mud flat extends 1$\frac{3}{10}$ miles southeastward of the point and curves to the northward, when it forms the western bank of Trinity channel.

Trinity channel, 1,800 yards wide, leads to the village of Siengdieng. At Tree islet, about 3½ miles inside its entrance, it divides, the eastern branch being narrow and becoming gradually absorbed in the mud flats that fill the bay to the northeast; the western branch at 2¼ miles northward of Tree islet narrows and is almost blocked by mud banks, but there is a 6 to 9 feet channel nearly to Siengdieng, which is 8½ miles above Tree islet.

Babusan, 573 feet high, is 1,800 yards east-northeastward of Santu, the passage between being clear.

Machui lies 600 yards eastward of Babusan, from which it is separated by a deep channel, is a barren island 1½ miles long, having a cone-shaped hill at its northern end 682 feet high. A small islet, 24 feet high, lies off its eastern end, and a mud flat extends 600 yards southward of it. There is a passage northward of Machui.

Anchorage.—There is good anchorage in 6 fathoms, mud, southward of Babusan and westward of Machui.

Werner bay is a bight 2 miles deep, northward of Machui, completely filled up with mud, and at its head is Ko u ang village.

Foul point, the southern extreme of the Slade range, has several rocks off it, the foul ground extending 600 yards to the southward.

There is a small islet close to the point, surrounded by rocks, and there are two islets ½ mile farther eastward.

Low island, 2½ miles eastward of Foul point and midway between Sibbald island and Tung chung, is flat, of an irregular shape, and 90 feet high. A rock 40 feet high, with foul ground extending 600 yards westward of it, lies 191° 1 mile from the southwestern point of Low island. There is a safe channel both northward and southward of Low island.

Bowring channel, which leads into Samsa basin, is 1,800 yards wide between the southeastern point of Sibbald island and Spike island. There is a rock 7 feet high at 97° 1,500 yards from the southeastern point of Sibbald island with a rocky reef extending 200 yards westward of it, and two islets to the northward, just off the mud flat, extending from Cheyangpao.

Spike island stands close to the Cheyangpao coast southwestward of Sibbald island; its summit, Spike hill, is 236 feet high and wooded. Its northern point is steep-to, and between it and Plover point a mud flat, on which are several islands, extends offshore; the northern edge of this flat is a well-defined curve.

Blackburn islets.—A rock, 55 feet high, from which a reef extends 200 yards eastward, lies 256° 1,600 yards from Spike hill. At 232° 1,400 yards from this rock is a rock 40 feet high, from which a spit extends eastward 500 yards and westward 200 yards. At 254° 800 yards from the 40-foot rock is an islet 78 feet high, with a rock 25 feet high eastward of it and shoal water for 200 yards around its western end. There is a deep channel 650 yards wide between these islets and Low island.

Plover point lies 247° 3$\frac{4}{10}$ miles from Spike hill; there is a rock 6 feet high 150 yards northeastward of the point and a brown islet, 20 feet high, from which a rocky reef extends northeastward 250 yards, lies 300 yards westward of the point.

The shore of the inlet from Plover point trends southwestward 3¾ miles to Ridge point, and it is much broken. A group of 4 islets stands on the mud flat, extending 400 yards offshore at 2 miles from Plover point, and 500 yards northwestward of the eastern islet is a rock with 10 feet of water over it.

Algerine roads, to the westward of Plover point, afford good anchorage.

The shore from Ridge point to Castle point, which lies 196° 3$\frac{6}{10}$ miles from it, is a series of deep indentations, the heads of which are only approachable at high water, on account of their being filled with mud flats. There are villages at the head of each indentation, and the valleys behind are richly cultivated. An islet 160 feet high, with a rock 4 feet high ¼ mile northward of it, lies about 600 yards offshore and on the eastern side of Aurora channel, at 214° $1\frac{2}{10}$ miles from Ridge point.

On a bluff in Fort bay, the second bay northward of Castle point, is Denglung, a picturesque village.

Castle point, the eastern entrance point of Samsa inlet, is steep-to. The tidal streams run past this point at a great rate, and there are generally heavy tide rips off it, but especially on the ebb. There is a bight, 1,400 yards deep, eastward of Castle point; it is filled with mud.

Tides and tidal streams.—It is high water, full and change, at Customs point, Santu, at 11h. 40m.; springs rise 24 to 26 feet, neaps 14 to 18 feet.

The tidal streams turn at high and low water on the shore, and in the entrance channels have a rate of 3 to 7 knots, according to the age of the moon. They follow the directions of the channels, dividing where there are islands and running at a greater rate past their salient points. The flood stream entering the inlet divides southward of Cone island, one main branch passing through Aurora channel into the broad part of the inlet, the other following Waterwitch channel to Santu.

Directions.—Proceeding toward Samsa inlet, pass midway between Rag islands and Spider island and steer for the entrance. When Channel rock is not visible it is best to pass eastward of it with Chingsan western summit in line with Hail point. Castle point is steep-to, and there are generally tide rips off it, which are heavy on the ebb. Cone island may be passed on either side, but the channel westward of it is the better. For Santu anchorage, when clear of Hail point keep in the middle of Waterwitch channel till abreast of Diver island, then pass eastward of the Kaiser rock and buoy, and steer for the anchorage, passing southward of the Lay rocks. The flood stream will keep a vessel in the center of the channels, but in entering against the ebb care is required in passing Castle point, Hail point, and between Diver island and Pillar rocks, as the stream takes a vessel on the starboard bow and turns her head off some points, even against a hard-a-port helm.

Supplies.—Fish and fowls may sometimes be obtained; there is no supply of fresh meat; there are a few vegetables. Supplies can be obtained from Fuchau.

No water can be obtained fit for drinking. Water for boilers can be purchased, and it is brought off in sampans carrying about 1½ tons, at a price of $2 a load.

Typhoons.—During the typhoon season these storms occasionally pass in the vicinity of Samsa. With easterly wind and a strong ebb stream, vessels of much draft become tide rode, particularly during the intervals between the heavy squalls, and a nasty sea sets in. The holding ground is good.

Climate.—The climate of Samsa is on the whole good; during August and September it is very hot, a temperature of 98° having been frequently registered afloat. A good deal of rain has been experienced during the latter part of October and the early part of November. As the winter sets in it becomes fine and bracing.

Rag islands are three islets situated about 7 miles southwestward of Spider island. Bittern rock, which covers at high water, lies 1 mile northward of the eastern islet. There is anchorage with tolerable shelter westward of the western islet.

Inlet.—At 284°, 3 miles from the western Rag island, is the opening to an inlet 10 miles deep, which has not been examined; there are 30 fathoms in its entrance.

Ragged point, about 10 miles southeastward from Steep point, is the northeastern extreme of a peninsula, averaging about ½ mile across, which extends 49°, 5 miles from Wanki bay. Diplo islet, with a reef extending 150 yards southeastward of it, is ½ mile southeastward of the point, and off the islet there is generally a heavy tide rip, and much sea in northeast winds. The passage between Diplo and the point is used by steam vessels with safety, which frequently anchor under the small island northwestward of Ragged point; sailing vessels should not use the passage, notwithstanding that junks do so, as the tidal streams are strong.

Black rocks lie about 7 miles east by north from Ragged point; the highest is 70 feet high.

Reef.—A reef awash at low water lies 68°, 6 miles from Black rocks; its position is said to have been passed over several times without any indication of shoal water being seen.

Larne islet lies about 7 miles east-southeast from Black rocks and is 356 feet high; there are large bowlders sticking up here and there on the islet, and near its summit are 3 houses. Ledges extend from its northern and southwestern points, and a rock 9 feet high lies 400 yards eastward of its northern point.

Larne rock lies 5½ miles south by west from Larne islet; is low and flat, with a reef 400 yards northward of it.

Tungyung, the eastern island on this coast, lies about 13 miles east by north from Larne island, and its summit is 500 feet above the sea. Its appearance is flat, with steep cliffy coasts, and a large village stands on its western side; a ledge of rocks extends about ¼ mile off its southern extreme.

There is good anchorage in the northeast monsoon in Bertha cove, southward of the western Tungyung island, which is 1,200 yards deep and 800 yards wide, in 6 to 4 fathoms; the sea is quite smooth. The western Tungyung island lies ¼ mile northwestward of Tungyung.

and it appears as part of Tungyung; a reef projects ½ mile off its northeastern point. There is a rock and shoal water in the passage between the islands.

Light.—A group flashing white light showing groups of 3 flashes in quick succession every 20 seconds, elevated 325 feet above high water, and visible 25 miles, is exhibited from a white cylindrical tower 46 feet in height, erected on the northeastern point of Tungyung island.

The light is obscured by the island in a westerly direction. Two white square dwellings are situated immediately above the light-house.

Fog signal.—When the fog signals of vessels under way are heard, two guns will be fired with an interval of 1 minute between them. This signal will be repeated after an interval of 15 minutes should the vessels' signals still be audible.

Fishing stakes.—Steam vessels should not attempt to make Bertha cove after dark, as it is encumbered by the worst type of fishermen's obstructions, viz, bamboo rope, connecting floating stakes to fish traps, which would probably foul the propeller.

Similar obstructions exist to the southwestward of Larne islet.

Claret rocks are about 1¼ miles southward of the eastern point of Wanki bay; three of the rocks are 20 to 30 feet high; they are surrounded by sunken rocks, the southern of which lies ½ mile southwestward of the southern rock above water, and the northern 1 mile northeastward of the northern rock above water. Pikiau point is ½ mile northward of this northern sunken rock; there is a channel between them, but sunken rocks lying off the point narrow it to 400 yards; it is therefore advisable to pass southward of Claret rocks.

Wanki bay is frequented by junks, but although it affords good shelter it is unsuitable for larger vessels. A rock, dry at low water, lies with the eastern point of the bay 84° about ¼ mile.

Tinghai bay, on the western side of Tung shan peninsula, affords safe anchorage in 3 fathoms in the northeast monsoon; there are the remains of a walled town on the shore of the bay, but the place is nearly deserted.

Southward and southeastward of this bay are many islets and rocks. Square rocks, the outer of these, and situated 3 miles southward of Tung shan peninsula, are 4 islets, the highest of which is 94 feet high; rocks drying 14 feet lie about 500 yards northward of them, and there are some sunken rocks within the group. Crab islet lies 1½ miles northeastward of the Square rocks; it is 93 feet high and surrounded by reefs, which extend about 800 yards northwestward of it. There are 2 islets and several rocks between Crab islet and Tung shan.

Tungsha (Alligator island), in Lat. 26° 09′ 30″ N., Long. 120° 24′ 00″ E., is a barren rock about 40 feet high.

Paisha (Gordon islet) lies about 5½ miles south-southeastward of Ragged point, is 500 feet high, and has foul ground extending for nearly 1 mile eastward of it. At 1¼ miles northeastward of the northern point of Paisha is a small black rock, about 25 feet high, surrounded by a reef, and 300 yards northwestward of the same point is a rock 10 feet high.

Gordon rock, 900 yards west-northwestward of an islet off the western point of Paisha, dries 7 feet at low water spring tides, and is steep-to, 9 to 11 fathoms being obtained around, except on its northeastern side, where shoal water extends 150 yards.

Tangki, about 2 miles southward of Paisha, is covered with cultivation, and rises to two conspicuous peaks, the higher of which is 947 feet above the sea. Its southeastern part is connected with the island by an isthmus of sand. There are 6 or 7 villages on this island. Magpie bay, westward of the southeastern part of the island, is a good anchorage affording shelter from the prevailing northeast wind, in 4½ fathoms, mud, with the summit of Tangkitau, an islet, 184 feet high, forming the southeastern end of Tang ki, bearing 126°, distant 1,000 yards.

Kialai is an islet 190 feet high, separated from the southern point of Tangki by a narrow neck of stones and sand, which covers at high water.

None of the passages between Tangki and Paisha have been surveyed, and they can not be considered safe.

Bluff head island, 216 feet high, lies 500 yards northeastward of Tangki.

Chingau, 295 feet high, is separated from the northern end of Tangki by a channel 400 yards wide; Kiaotse, 260 feet high, is almost connected with the northeastern end of Chingau. A group of rocks, 72 feet high, lies 800 yards north-northwestward of the northwestern point of Chingau, and about 200 yards off this point is a rock which dries 18 feet.

Rock.—A rock, with a depth of 1½ fathoms over it at low water, is reported to exist in a position from which the summit (295 feet) of Chingau bears 158°, distant 1 mile and 200 yards. This position must be considered approximate.

Trio rocks are three in number: the highest, 79°, 3$\frac{8}{10}$ miles from Tangki summit, is 101 feet high and is split into two parts; close southeastward of it is a rock which is nearly awash at high water. The second of these rocks is ¼ mile south-southeastward of the highest and is 78 feet high; the third is 225°, 1,800 yards from the highest, and is 46 feet high. The channel between Tangki and the Trio rocks is safe.

Magpie rock, 140°, 1,000 yards from Kialai, is small and 35 feet high. Shoal ground, with a least depth of 21 feet, rock, extends

500 yards northwestward of the Magpie; between the shoal ground and Kialai there is a clear passage 8 fathoms deep.

Swallow rock, 400 yards southeastward of the Magpie, is a pinnacle with 3 feet over it. A rocky ledge connects Swallow and Magpie rocks.

The appearance of the water does not indicate the existence of shoal ground, nor does the sea break on this rock even during strong northeast winds.

Chung she (Pastel rock), 1 mile westward of the southern point of Tangki, is a small islet 102 feet high, and uninhabited.

Matsu, an island about 1½ miles south-southwestward of Tangki, is thickly populated, and there are 12 or 13 villages on it; it is cultivated, and its southwestern part 793 feet high.

Anchorages.—Pirie bay, on the northern side of Matsu, affords good shelter from eastward, southward, and westward, in 5 fathoms, at about 600 yards from the shore, but it is a bad anchorage on account of rocks.

Matsu road, on the western side of the island, is a more frequented anchorage, with good holding ground, sheltered from the prevailing northeast wind, and also from the swell. It is convenient for ships from the northward to await the rise of the tide to enter Min river.

Vessels drawing 18 feet and under can anchor 600 yards offshore, with the western end of Tungsha island in line with Bayard point, the western end of Matsu, and the gap in the hills bearing 72°.

Tides.—It is high water, full and change, in Matsu road at 10h. 22m.; springs rise 20½ feet, neaps, 16 feet; neaps range 10½ feet.

The highest tides are on the days of full and new moon.

Matsu strait, between Matsu and Tangki, is 1 mile broad in its narrowest part, between Swallow rock and the rocks northward of Wuan.

Fishing nets with bamboo floats are laid in the strait, but channels are left into Pirie bay.

Pirie rock, a pinnacle with 21 feet over it, lies in the fairway of Matsu strait, with the summit of Wuan bearing 154°, distant 1,400 yards.

Wuan (Reef island) is 191 feet high and the largest of several islets and rocks off the northeastern point of Matsu. It is separated 400 yards from Matsu, the passage between having several rocks in it and 3¼ fathoms water. A reef extends 400 yards southward of Wuan, and there are detached islets and rocks for 500 yards northward of it.

Flat rock, 180°, 1¼ miles from the eastern extreme of Matsu, is 10 feet high: there is foul ground close around the rock.

Norman Court rocks are two pinnacles lying north and south from each other and 300 yards apart; the northern pinnacle has 5 feet over it, the southern 9 feet. From the northern pinnacle Flat rock bears 352°, distant 600 yards.

A patch, with 2¼ fathoms over it, lies 49°, 350 yards from the northern pinnacle.

Pilot rock lies 114°, 3¾ miles from Flat rock and is a pinnacle with 1 foot over it and 8 to 11 fathoms within 200 yards around. The sea seldom breaks on this rock except at low water.

Sea Cat lies 164°, 1¾ miles from Flat rock and is a conspicuous black rock 20 feet high; 150 yards westward of it is a rock which uncovers at half tide. A patch with 19 feet over it lies 200 yards southwestward of Sea Cat, and there is a depth of 8 fathoms at about 300 yards northward of it. The soundings around are 14 to 17 fathoms.

Sea Dog lies 200°, 1⅘ miles from Sea Cat; is a precipitous black rock, 164 feet high. Close eastward of Sea Dog there is a small rock, 33 feet high; and Pup rock, 22 feet high, lies 24° 800 yards from it. Northwestward of Sea Dog for about 500 yards and northward for 700 yards there is much foul ground, some of the rocks being above low water.

Hebe rock lies 222°, 1½ miles from Sea Dog; is a sharp pinnacle with 11 feet over it.

A second pinnacle, with 18 feet over it, lies 200 yards north-northeastward of Hebe rock, and another, with 26 feet over it, east-northeastward 266 yards.

The sea very rarely breaks on Hebe rock even in strong northeast winds, nor is there any swirl or disturbance of the water to indicate the presence of foul ground.

Paikuen (White Dogs) is a group of three islands and several islets and rocks.

Tungkuen (East Dog island), lying 9 miles southerly from Matsu and 11½ miles off the coast, also called "Middle Dog," is rocky, precipitous, and 384 feet high. The channel between Tungkuen and Tungsha is safe for ships outside of 1,600 yards of Tungkuen.

Lingtau is a small island separated from the southern end of Tungkuen by a shallow passage 200 yards wide; it is 211 feet high, rocky and precipitous.

Light.—A fixed and flashing white light every 30 seconds visible from 109° to 39° over an arc of 290° and obscured from 109° to 39° by the Tungsha and Middle Dog island, except between 90° and 81° and from 60° to 56° is exhibited from a circular white tower 64 feet high and 257 feet above high water, located on the northeastern end of Tungkuen island.

The keeper's dwelling and walls are white.

Fog signal.—In answer to a vessel's fog signal three guns are fired with an interval of 2 minutes between each; and if the vessel's fog signal is still heard the signal is repeated after an interval of 15 minutes.

Position.—Tungkuen light-house is in Lat. 25° 58′ 10″ N., Long. 119° 59′ 02″ E.

Tayu (Castle rock), 23°, 1 mile from Tungkuen light-house, is of small extent, 87 feet high, and has a remarkable thumb on its northern side. Rocks, some above water, extend 300 yards southward of Tayu, and a reef, which dries 13 feet, lies nearly midway between it and the northeastern extreme of Tungkuen.

Shiaoyu, 60°, 1¼ miles from Tungkuen light-house, is a rock, 3 feet high. A small rock, which dries 11 feet, lies 66 yards south-southwestward of Shiaoyu.

Tungsha (East Sand island) is 1½ miles westward of Tungkuen. The summit, which is a bowlder on the center of 3 rounded hummocks, is 594 feet high. The southwestern slopes of the ridge are strewn with sand, and show white in misty weather when little else of the island is visible.

Breakwater rocks extend southwestward about 800 yards from the northwestern end of Tungsha; two of the rocks are conspicuous, the outer being 53 feet high. These rocks and the sand spit, with which they are connected, shelter Tungsha road from the northeast swell.

Anchorage.—From the southward the best anchorage to await the rise of tide to cross river Min bar, is southward of Breakwater rocks in 22 feet, sand, with the smaller and northern of the two rocks (33 feet high) in line with Matsu summit, and the southern extreme of Tungsha in line with Yungliu summit.

Tides.—It is high water, full and change, in Tungsha road at 10h. 22m.; springs rise 20½ feet, neaps rise 16 feet, neaps range 10½ feet. The highest tides occur on the days of full and new moon.

Underwood banks, lying southwestward of Tungsha, are of sand; the least water on them is 24 feet, with Tungsha summit bearing 31°, distant 2 miles, and the same depth with Tungsha summit bearing 60°, distant 2¾ miles.

Aymar rock, 278°, 5½ miles from Matsu summit, is a pinnacle with 3 feet over it.

Buoy.—A red and black checkered buoy, surmounted by a black diamond-shaped cage, is moored in 11 fathoms, about 550 yards east-southeastward of the rock. Aymar is painted on the buoy in white letters.

Clearing marks.—The southern extreme of Kialai in line with Hamelin point, the northwestern extreme of Matsu, bearing 73°, leads 1,500 yards southward of Aymar rock and Crab island, bearing 356°, leads 1,200 yards eastward of it.

Outer Min reef is a patch of rocky heads, which dry at low-water springs, 600 yards in extent east and west and 500 yards north and south. The two principal rocks are sharp pinnacles which dry 13 feet, lying east-northeast and west-southwest from each other and 400 yards apart. Two flat rocks lie 170° from the eastern pinnacle, one at 200 yards distant, drying 8 feet, and the southern at 400 yards distant, drying 6 feet.

Bisbee rock, 350°, 600 yards from the western pinnacle of Outer Min reef, is a pinnacle with 12 feet over it. There is foul ground for 200 yards northward of the rock.

There is a depth of 10 to 11 fathoms, mud, at the distance of 200 yards around Outer Min reef and Bisbee rock and between them.

Buoy.—A red and black checkered automatic whistling buoy, with Min painted on it in white letters, is moored in 10 fathoms, about 900 yards east-northeastward of the northeastern pinnacle of Outer Min reef. With a slight swell the buoy has been faintly heard at a distance of 2 miles, but no reliance can be placed upon hearing it.

High Sharp peak just open northward of the northern end of Sharp peak island, 292°, leads northward of Outer Min reef and to near No. 1 buoy.

Sand peak, $1\frac{6}{10}$ miles southwestward of Sand peak point, is a sharply defined summit 642 feet high on the southern side of the entrance to the Min river. The sand on the eastern slopes of this hill often shows brightly through the mist when little else is visible. Meiwa town is on the coast at 1 mile westward of Sharp peak point.

Hoshungshan (Serrated range), $7\frac{1}{2}$ miles westward of Sand peak point, rises 2,042 feet, and is conspicuous from all directions.

Min river approach.—The water for many miles outside the river is muddy and discolored, so that sunken rocks or shoals can not be seen unless the sea breaks on them.

Changes in the channel of Min river, especially on the outer bar, frequently take place, so that no survey represents its condition for long. It was, however, reported in 1902 that the bar had not materially changed during the last few years.

Pilots for the river, who are under the jurisdiction of the harbor master at Pagoda anchorage, cruise in their boats off Matsu roads in the northeast monsoon and between the bar and Matsu in the southwest monsoon, and are qualified to pilot vessels thence to Pagoda anchorage.

The words "Licensed pilot boat" are painted on the head of the mainsail, and International Code Flag R is generally carried.

European pilots sail in boats painted yellow; Chinese in black; both carry the same certificate. Only licensed pilots should be engaged, and the Europeans are to be preferred.

In the southwest monsoon, if necessary to obtain shelter, the pilots go to Pirie bay.

The pilotage ground for the port of Fuchau is divided into two sections, viz, the outside ground extending from the outlying islands to Sharp peak anchorage and the inside ground extending from Sharp peak anchorage to the upper limits of Pagoda anchorage.

In addition to the words "Licensed pilot boat" the number of the boat is also painted on the head of the mainsail, and a flag is flown of which the upper horizontal half is yellow and the lower green.

The European pilots have a rendezvous on Matsu island, and there is always one there, except under exceptional circumstances.

Every pilot when boarding an inward-bound vessel shall hand to the master thereof his license, together with a copy of the pilotage and harbor regulations.

The pilot who brings a vessel in from sea is entitled to pilot her to sea when she next leaves the port, unless in the meantime a complaint for misconduct or incapacity shall be made against him and proved before the harbor master.

Outward-bound vessels shall not be left by the pilot until well clear of all dangers within the limits of the pilotage ground. Inward-bound vessels shall not be left until moored in a safe berth, or taken charge of by a harbor pilot.

Bar.—The bar extends 6 to 7 miles from the mouth of the river, and is hard sand, dry in many places at low water. Rees rock, a black pinnacle, awash at high water, lies on the bar at 26° $3\frac{4}{10}$ miles from Sand peak point. There is one safe ship channel over the bar, which is marked by large buoys.

There was a depth of 13 feet at low water on the outer bar in 1905.

Buoys.—Nos. 1 and 2 fairway buoys, owing to their exposed position, are liable to drift in heavy weather.

No. 1 buoy has been moved, and is now (October, 1906) situated at a distance of $7\frac{1}{10}$ miles 112° from Sharp peak △.

Buoy No. 2 has been moved, and is now situated at a distance of $4\frac{6}{10}$ miles 117° from Sharp peak △.

Buoy No. 3 has been moved, and is now situated at a distance of 3 miles 129° from Sharp peak △.

A 1-fathom patch, situated between Nos. 1 and 2 buoys, is marked by a red conical buoy moored on its southern edge.

The inner bar is about 6 miles within the outer edge of the outer bar, and the general depth over it in 1900 was 10 to 11 feet, hard bottom, but there were several mounds of soft mud with 8 to 9 feet over them.

After a gale the heavy rollers on the bar soon subside.

As a rule the pilots do not take a vessel drawing over 24½ feet over the bars, but during the northeast monsoon at springs vessels drawing 26½ feet can reach Pagoda anchorage.

Tides and tidal streams.—It is high water, full and change, on the Min river bar at 10h. 27m.; springs rise 20½ feet; neaps rise 16 feet; neaps range 10½ feet. The highest tides are on the days of full and new moon.

The rate of the tidal stream on the bar is 1 to 4 knots, according to the age of the moon. The flood or west-going stream commences 4½ hours before high water; the ebb or east-going stream 1½ hours after high water, except during freshets, when it begins earlier and runs much longer.

Anchorages.—There is anchorage, sheltered from the sea from any direction, between the outer and inner bars in a pool of deeper water; a good position is 79° ½ mile from No. 3 buoy in 4¾ to 5 fathoms.

Wufu island, 5½ miles in length northwest and southeast and about 3 miles in breadth, lies within the inner bar, and the main channel of the Min passes northward and westward of it. Square peak, its summit, is 904 feet high and conspicuous. The island has been only partially examined.

South coast passage between Wufu and the mainland southward of it is not now used by shipping. It has not been examined westward of Square peak, and its condition is unknown, but it is said to have a least depth of 17 feet at high water springs.

Sharp peak island, northwestward of the inner bar, rises to a pointed summit 600 feet high; there are some conspicuous European dwellings on the island, among which are the office and dwelling house of the telegraph company on the high ground of the northeastern part of the island.

Weather.—A weather report will be signaled from the telegraph station on Sharp peak island, if asked for by the International Code.

Woga channel.—Northeastward of Sharp peak island is the bar to Woga channel, which is intricate and unsuitable for shipping, but much used by junks which emerge from the river here in fleets, often conducted by a single pilot.

Europe rocks, in Woga channel approach, are two heads of sand and mud over rock, with 4 feet water over them and 500 yards apart.

Buoy.—A black conical buoy is moored on the southern side of these rocks. It is maintained by the junk owners.

Peak shoal no longer exists, and buoy marking it has been withdrawn.

Woga island lies northwestward of Sharp peak island, from which it is separated by Woga channel; it has been but partially examined.

Eme rock, a pinnacle with 6 feet over it, lies with Sharp peak point bearing 104°, distant 700 yards.

A red nun buoy is moored close southward of it in 15 feet water.

Zephyr rock, a pinnacle with 3 feet over it, is nearly 200 yards southwestward of Woga point, the southern point of Woga island. There is deep water close to its southern and western sides, which causes a heavy overfall at the height of the tide.

Temple rock, a pinnacle with 6 feet over, lies with Woga point bearing 100°, distant 1,600 yards. The channel at this part of the river is 400 yards broad, and is marked by a red buoy on the southern side of Temple rock and a black buoy close to the northern end of the stone barrier on the opposite side of the river, near Wild Duck rocks.

The Brothers.—Off the northeast side of Wufu there is a group of 3 islands, named Hokiang, East Brother, and West Brother. Between West Brother and Hokiang there is a very narrow channel for ships; at 15 yards southward of West Brother there is an isolated ledge of rocks, about 24 yards long, which has two heads, each uncovering 2 feet at low water; the channel, in which there is a depth of 3 fathoms, is southward of the ledge, but it is not safe for vessels of 18 feet draft, except at high water, and then only with a pilot.

Tides.—It is high water, full and change, at West Brother island at 10h. 32m.; springs rise 19½ feet; neaps rise 15½ feet; neaps range 10½ feet.

Kinpai pass, between the northern point of Wufu and the mainland, is dangerous to strangers, particularly at or near spring tides, for then the rapidity of the streams produces eddies that occasionally cross the channel, and render a vessel totally unmanageable, even in a fresh breeze; it should, therefore, never be taken without a pilot or local knowledge, and then at slack tide. On the flood a dangerous eddy extends from Kinpai point above it in the direction of the Ferry. At about ½ mile eastward of the pass are Salamis islet on the southern side of the channel and Pass islet on the northern.

Saluting station.—The saluting station at the Min river entrance is located on the northern side of Kinpai pass just eastward of the narrowest part, and is either at White fort or very close to it.

Oriental rock, on the northern side of Kinpai pass and about 300 yards southwestward of Pass islet, is covered 4 feet at high water, but it is marked by a beacon. This beacon, which is rather more than 300 yards southward of the square tower on the northern shore, consists of a spar surmounted with a cage, 14 feet above high water, and painted red. "Oriental rock" is painted on the cage in white letters. Vessels must pass southward of the beacon and not nearer than 100 feet, guarding against being set on the rock by the flood stream.

Tides.—It is high water, full and change, at Pass islet, at 10h. 50m.; springs rise 19 feet.

Wolverene rock, with 9 feet over it, lies 246° 300 yards from the flagstaff on Kinpai point. Shoal ground with depths of 9 feet over it extends westward of Kinpai point to about 700 yards 251° from the flagstaff.

Middle ground, a patch of 10 feet surrounded by depths of 2¾ to 3 fathoms, lies 280° 1,200 yards from Kinpai point flagstaff. This shoal is constantly changing.

A bank of 2 fathoms lies 200 yards northeastward of the patch, and two banks of 11 and 12 feet lie about 600 yards southwestward of it.

The passage northward of the Middle ground is not recommended, as there are said to be heaps of stones in it, which were placed there during war time.

Kwantao shoal, with a least depth of 9 feet on it, extends about 350 yards off the left bank of the river from about 1,000 to 2,600 yards above Kinpai point. This shoal is increasing.

Tongue shoal, which is steep-to, extends more than halfway across the river from the northwestern side of Wufu.

Half-tide rock, near the upper end of Tongue shoal, is covered 5 feet at high water, and marked by a stone beacon painted black. From this to Tintao, 2 miles higher up, the bottom is very irregular.

Buoy.—A black conical buoy has been moored, in a depth of 16 feet at low water, about ½ mile to the northward of Half-tide rock beacon, to mark the edge of the shoal water extending from the western side of Wufu island.

Stevens point (locally Rocky point) is on the left bank of the river bearing 252° from Half-tide rock; a reef runs 100 yards southeastward from it with a depth of 8 fathoms at its outer end. This reef is marked at its extreme by a spar beacon carrying a cage, painted red. Vessels should not pass within 200 yards of this beacon.

Tree point shoal, on which is a least depth of 9 feet, lies westward of Tree point, the western end of Wufu island, and the navigable channel between the left bank of the river and the shoal is only about 100 yards wide. This channel was reported in 1902 to be the worst part of the river fairway seaward of Pagoda anchorage, and it was said to have a least depth of 11 feet at low-water springs.

The channel over the shoal eastward of its shallowest part had a depth of 12 to 13 feet when it was examined in 1899.

Tree point—Buoy.—A black conical buoy marks a 1½-fathom patch, situated northeastward of Tree point shoal, at a distance of about 800 yards east from Stevens point beacon.

Hsinfung rock, with a least depth of 5 feet over it, lies 400 yards east-northeastward of Red peak; a red conical buoy lies 50 feet eastward of it.

The ground between this rock and Tintao beach is foul.

Mingan pass, at 1¾ miles above Stevens point, is nearly 600 yards wide, and the land rises 1,500 to 2,000 feet on either side. Mingan is on the left bank of the river and Couding island is on the same side at ¾ mile farther up. Off the eastern side of the island is Scout rock, at the end of a ledge projecting 25 yards from the islet, with 7 feet near its extreme.

When dropping through the Mingan pass with the ebb stream guard against an eddy setting from the point above Couding island onto Scout rock.

Min river, at Black cliff, about 1 mile above Couding island, is 600 yards wide. The tidal streams here, owing to the narrowness of the river, attain a rate of 4 to 5 knots at springs.

Spiteful island (Tasea), 1,200 yards southward of Black cliff, is 57 feet high, of a light color from being covered with vegetation, and uninhabited. It is steep-to on the northwestern side, but on the southwest side a strip of rocky ground extends from it, terminating in Hurst rock, which has 4 feet over it and is situated 254° 280 yards from the summit of the island.

Parkhill rock (Niutau) has 3 feet water over it and is the shallowest part of a large rocky patch lying about 255° 600 yards from the summit of Spiteful island. A black nun buoy, surmounted by a black spherical cage, marks the northern edge of this patch; vessels must pass northward and westward of the buoy.

A small patch, with 18 feet over it, lies nearly midway between Parkhill rock and Pine point, but the changes southwestward of Spiteful island are very frequent.

Flat islet (Shiaoseu), 550 yards southward of Spiteful island, is low, and there is a conspicuous tree on its southwestern end.

Foul ground exists between Spiteful island and Flat islet and also between the islet and Yangseu village to the southwestward.

The tidal streams inside Flat islet occasionally attain a rate of 5 to 6 knots.

Watters rock, 200 yards off the right bank of the river at $1\frac{9}{10}$ miles above Flat islet, is awash at high water.

Shoal water extends off the right bank of the river to approximately lines drawn 223° 1,500 yards from Niutau buoy, and thence 196° to Joss house point, at 600 yards above Watters rock.

The river within Spiteful island opens out to a width of over 1 mile, but the navigable channel between Losing island and the shoals off the eastern bank is about 700 yards wide.

Losing island (Falling star), the northern end of which is 255° 1¼ miles from Spiteful island summit, extends thence southwestward $1\frac{8}{10}$ miles.

It is flat, except for a small hill 93 feet high at its southwestern end, upon which stands the pagoda, from which the anchorage takes its name. This pagoda is 92 feet high, and the top of it is therefore 185 feet above the sea. At extraordinary rises of tide this island is under water, when the houses and the hill are all that is visible of it. The island is densely populated, well cultivated, and intersected by small canals for irrigating purposes.

Losing island is separated by a shallow channel 200 yards wide from the western bank of the river. There is a bridge across this channel from under Pagoda hill northwestward to the Joss house at Mamoi.

Buoy.—A red conical buoy has been moored in a depth of 23 feet to the eastward of Losing island, at a distance of 1 mile 68° from the pagoda, to mark the northern end of the spit extending from Pagoda rock. This buoy should be left on the starboard hand when proceeding up the river.

Pagoda rock, 170° 460 yards from Losing pagoda, is a small pinnacle drying 8 feet at low water. On it is a red iron pile beacon, surmounted by a cage, which exhibits at 16 feet above high water a small fixed red light.

The passage between this rock and Losing island is blocked at low water to any but small vessels, and the shoals northeastward of the rock appear to be extending.

A bank, which dries 4 feet, extends about 600 yards southward of Pagoda rock. The river turns sharply round this bank and runs northwestward.

The custom-house is a large building on the right bank of the river at 147° ¾ mile from the pagoda.

Mamoi point is on the left bank of the river above Losing; Mamoi, a large Chinese village, is on the point, and embraces a small European settlement on the hill above. Here is a British vice-consul, a medical officer, a Lloyd's agent, and 1 or 2 other European residents. There are two batteries near Mamoi point.

The vice-consul at Mamoi undertakes only the entry and discharge of seamen. Vessels are entered and cleared at the city.

Mamoi rock, 200 yards west-southwestward of Mamoi point, is a pinnacle drying 11 feet at low water. On it is a pole surmounted by a red cage in the shape of an inverted truncated cone, which is 6 feet above high water.

A small rock, 35 yards westward of Mamoi point, dried 5 feet at low water.

Pagoda anchorage is about 22 miles above the outer bar and 11 miles below Fuchau city, of which it is the port.

There is good anchorage for vessels of any draft along the southeastern coast of Losing and off the custom-house; also for vessels drawing not more than 15 feet westward of Pagoda rock in a narrow channel between the sand banks, but changes are constantly occurring in these banks of which only the local harbor pilots are aware.

Vessels must moor, and on account of the strong tidal streams the length of cable on each anchor should be about five times the depth of water.

When approaching the anchorage vessels are boarded and berthed by the harbor master and harbor pilot.

Vessels laden with gunpowder or other explosives must anchor at least 1 mile below the lower limit of the harbor, and must hoist a red burgee (letter B of the International code) at the fore.

Vessels must moor in accordance with orders received from the harbor master, and must not shift berth without his permission.

Storm signals are shown from the customs signal station, Pagoda anchorage.

Tides and tidal streams.—It is high water, full and change, at the custom-house at 11h. 50m.; that is, 1h. 20m. later than on the outer bar; springs rise 17 feet 6 inches, neaps rise 14 feet 8 inches; neaps range 12 feet 10 inches. The water in the river is generally highest in the northeast monsoon and lowest in the southwest. Remarkable rises of the water occur now and then, as in August, 1885, during a typhoon, when springs rose to 24 feet.

The tidal streams at Pagoda anchorage run in the direction of the deep channel at a rate of 1 to 3 knots, according to the age of the moon. The ebb stream during freshets attains a rate of over 5 knots, but in the confined portions of the river, particularly at Kinpai pass and between Mingan pass and Spiteful island it often exceeds 7 knots, and great care is necessary in navigating these parts of the river on account of the strong eddies.

The flood stream begins 5h. 15m. before high water, and the ebb 1h. 0m. after high water, except during heavy rains in the interior, when it commences earlier, and sometimes overcomes the flood altogether.

The height of the tides and the time of the turning of the streams are both influenced by the direction and force of the wind.

Freshets occur occasionally after heavy rain in June, July, and August. In August, 1886, the ships in Pagoda anchorage did not swing to the flood stream for three days, and several dragged their moorings.

Directions.—On account of changes constantly taking place in the channel over the bar and in the river caution is necessary, and no attempt should be made to enter without a pilot.

The best time for a vessel with a speed of 10 knots to arrive at the outer bar is at high water.

Enter the river passing close northward of No. 1 buoy, steer direct for No. 2 buoy leaving it close on the starboard hand, then steer direct for No. 3 buoy and leave it also close on the starboard hand.

Now bring a dark ravine, said to be difficult to distinguish, on the northern slope of the 450-foot hill on Wufu at about ½ mile southward of Kinpai point, in line with the south bluff point of Hokiang, 283°; keep this mark on until the northern end of West Brother is shut in by the northern end of East Brother, and pass southward of Peak shoal with this last mark on, leaving Peak shoal buoy on the starboard hand. When High Sharp peak is in line with Woga point, 315°, alter to that course. Pass about 300 yards northward of East Brother and West Brother, then midway between Temple rock red buoy and the stone barrier black buoy, when alter course for Oriental rock beacon, passing it at 50 yards on the starboard hand. Keep the middle of the channel through Kinpai pass. Attention must be paid to the steering in this vicinity, as there are strong eddies and the flood stream sweeps over Oriental rock.

After passing White fort bring Oriental rock beacon in line with Temple point, 79° astern, until White fort flagstaff (there are many flagstaffs and forts near this spot) is in line with an old square tower below the big fort on the hill. Keep this mark on until abreast of Kwantao, and bring the rock on Wedge island to touch the western edge of a remarkable clump of trees near Tunui, 225°.

Pass Wedge island at about 150 yards and keep about 200 yards from the left bank. Leave Stevens point reef beacon 200 yards on the starboard hand, follow the trend of the shore at nearly 400 yards distant, and leave the red conical buoy marking Hsinfung rock, northeastward of Red peak, at least 80 feet on the starboard hand. This track leads past Tree point shoal in 3 fathoms.

An alternative course is from off Tunui to bring the eastern side of Mingan pass in line with a whitewashed mark on Couding island 206°, which leads over Tree point shoal in 12 to 13 feet. Steer through the middle of Mingan pass and give a berth of 200 yards to Couding island to clear Scout rock. After passing Black cliff, steer to leave Niutau rock buoy on the port hand, using the chart as a guide, thence direct for the pagoda until a whitewashed mark on the hills ¾ mile behind Customs point is halfway between the point and the customs buildings, bearing 202°, which mark leads to the anchorage. In rounding to for anchoring with the flood stream running, do so in plenty of time to avoid being set on the bank southward of the pagoda.

A vessel of much draft proceeding down the river in one flood tide from Pagoda anchorage should have a speed of 12 to 14 knots in order to have sufficient water, and should start about 2½ hours before high water on the bar.

Position.—The medical officer's flagstaff is in Lat. 25° 59′ 18″ N., Long. 119° 26′ 38″ E.

Imperial naval yard.—North of Mamoi, on the left bank of the river, is the Imperial naval yard, 700 yards long and 350 yards broad. It is devoted solely to building and repairing purposes, and is furnished with modern appliances. There are 3 building slips, but the bottom is silting up in front of them. Vessels of 20-foot draft can line alongside the yard at high water.

Repairs.—In the imperial naval yard there are hydraulic sheers capable of lifting 70 tons. The wharf under the sheers has a depth of 16 feet alongside at low water.

Large repairs to hull and machinery can be executed. A steam vessel of 2,000 tons displacement was built (1906).

There is also a small private yard where small repairs can be done, but the principal work is building and repairing steam and motor launches.

Coal.—Two private firms import coal; there is usually from 2,000 to 4,000 tons in stock.

Docks.—The old dock near the imperial naval yard is falling to pieces and useless.

The government dock, the entrance to which is situated 200 yards 66° from the Pagoda, is 318 feet long on blocks, and 69 feet wide in the entrance at the level of the sill. There is a depth of 26 feet over the sill at high-water springs, but a bank in front of the entrance only permits of vessels of 12 feet draft to be docked at high-water springs, and of 13 feet at extraordinary springs.

The slip in the naval yard will take up a vessel of 500 tons displacement and drawing 16¼ feet.

Supplies.—Beef, bread, and vegetables can be obtained.

Trade.—The principal foreign imports are opium, cotton and woolen goods, kerosene, and metals; the native imports are cloth, hemp, indigo, birds' nests, medicines, opium, superior Chinese paper, rice, silk piece goods, and tobacco. The principal exports are tea, bamboo shoots, mushrooms, wood poles, and paper.

In 1905 the value of the foreign imports at Fuchau amounted to $5,379,795, and of the exports to $2,814,585.

In the same year the number of vessels entered was 531, with an aggregate tonnage of 453,385 tons. These figures do not include the inland stream-navigation trade or the junk trade.

Communication.—The coasting trade southward with Hongkong is in the hands of the Douglas Steamship Company and the Osaka Shosen Kaisha, while the Indo-China Company shares with the China Merchants Steam Navigation Company the traffic for Shanghai. The mail steamers of the North German Lloyd call regularly on their way south from Shanghai during the tea season from May to October.

During this season the intermediate steamers of the Peninsular and Oriental Company call once a fortnight homeward bound. A Japanese line of steamers runs a monthly vessel from Shanghai via Fuchau, Amoy, and Formosa to Hongkong, and thence to Japan, Korea, and Vladivostok.

The large steam vessels which enter the port chiefly carry teas to London, Bremen, New York, and Australia.

A Japanese steam vessel makes regular trips between Fuchau and Hunghwa, and also between Fuchau and Santu. Launches run regularly between Fuchau and Kwantao, and to Chang munn near the mouth of the Min river.

The Min river, between Pagoda anchorage and Fuchau, is in an unsatisfactory state and silting up. There is a barrier about halfway between these places, which stops even launches between half tide and low water. Vessels drawing 11 feet can reach the city, and they must take advantage of spring tides, and once there they must wait for the next spring tides to release them. A pilot is required, and as it is necessary to mark the channel, notice must be given to the harbor master at Pagoda anchorage at least 2 days previous to going up or down. There is swinging room for vessels of about 160 feet in length when moored in 12 feet off Fuchau; longer vessels moor head and stern. Steam launches ply between Pagoda anchorage and Fuchau.

Fuchau fu, otherwise Fuchau, is a city built on a plain inside an amphitheater of hills, each extremity of which touches the river, and is 2 miles from the left bank of the river, with which it is connected by a line of suburbs. The city proper is surrounded by walls 8¼ miles in circuit. The foreign merchants and foreign consulates are principally on the right bank of the river, on the northern side of the island of Nantai, which is connected to the mainland by a stone bridge. Fuchau is about 9 miles above Pagoda anchorage.

The population of the city and its surburbs is estimated at 636,000.

The tartar-general, or Chiang chun, and the governor-general of Fuhkien and Chehkiang, live within the city. The tartar-general is the highest officer in the province, ranking with but before the governor-general.

There are about 150 European residents in Nantai, where there is a club, a Protestant Episcopal chapel, and a Roman Catholic chapel.

Tides.—It is high water, full and change, at Nantai, Fuchau, at 0h. 40m., or about 50 minutes later than at Pagoda anchorage.

The tidal streams are rapid at springs, and the outgoing current is strong after rain.

Climate.—The climate of Fuchau is generally good; fires are required between the middle of November and the beginning of April; English winter clothing is used. The temperature during the year varies from 93° to 37°; the hottest month being July, with a mean temperature of 84°, and the coldest, February, with a mean of 54°. The highest temperature recorded during 13 years is 99°; the lowest 31°.

Hail, snow, and ice are very uncommon, except on the mountains. Kushan peak, 2,900 feet high, and about 5 miles eastward of Fuchau, is occasionally capped with snow in February.

The yearly rainfall during 12 years varied from 35 to 58 inches.

Epidemics of measles and cholera occasionally break out amongst the native population, and are generally caused by close crowding and bad water.

Winds.—The northeast monsoon usually sets in early in September and blows until May; it is strongest and most steady during December and January. Between June and August southerly winds are prevalent and thunderstorms are of common occurrence.

Typhoons rarely enter Min river; only four were experienced at Pagoda anchorage during the 13 years previous to 1886.

Postal and telegraphic communication.—The Eastern Extension, Australasia and China Telegraph Company have an office at Fuchau, whence messages are forwarded to all parts. There is a Chinese telegraph office at Mamoi for local messages, which is under the control of the Government. There is postal communication and letters are sent by the first steam vessel; the post-office is at the British consulate, Nantai.

There is a submarine telegraph cable between Min river entrance and Tamsui in Formosa.

The river above Fuchau is navigable to Shuiko, a distance of about 60 miles; in winter it is full of difficulties. A number of native-owned steam launches ply between these places.

Communication in the country is carried on by means of boats on the waterways of the Min river and its tributaries, by junks on the coast, and by coolies who bear everything on their shoulders on the stone paths over the hills. Pack animals and wheeled vehicles are unknown.

CHAPTER VII.

MIN RIVER TO AMOY.

Coast.—From Sand Peak point to Cows Horn point the coast trends south-southwestward 7 miles to Niuto, and thence southward 9½ miles to Cows Horn point; the 5-fathoms contour line is 4½ miles off the land. A sandy beach extends from Sand Peak point to Cows Horn point.

McCauley rock, 67° 1½ miles from Niuto, dries 3 feet, and is the southern of the rocks and shoals which extend off the coast northward to Sand Peak point.

Tessara islands.—Tessara, the largest island of this group, lies about 2 miles east by north of Cows Horn point and is 221 feet high. An islet, 95 feet high, with foul ground extending nearly ½ mile southward and southeastward of it, lies 1,200 yards eastward of the island, with which it is connected by a reef of rocks.

Reefs extends ½ mile northeastward of Tessara island, in which direction, at the distance of 1,600 yards, is Great Dragon islet, 142 feet high. Two rocks, drying 5 feet, lie about 800 yards westward of Tessara. There is nothing here sufficiently extensive to shelter a vessel in the northeast monsoon.

Brown rock, 1 mile northwestward of Tessara, is 90 feet high, and cleft in two.

Namoa rock, about 800 yards westward of Brown rock, is a rocky patch, 100 yards long north and south and 150 yards broad, with a least depth of 4 feet at low-water springs over two pinnacles about 30 yards apart near its center.

Fairway island, 249° 1,800 yards from Tessara island, and 1 mile eastward of Cows Horn point, is 183 feet in height. In the channel between Fairway island and the main there is a depth of 7 fathoms.

Fairway reef, which dries 10 feet, is 1,400 yards southwestward of Tessara island, and between there are depths of from 3½ to 4 fathoms.

Caution.—It is not considered safe for large vessels to pass inside Tessara islands.

Haitan island, the largest of the group, is about 16 miles in length north and south, with a general width of 5 miles. Its northern part is high, whilst the eastern and western coasts are of moderate height, but low in places, and indented by deep, sandy bays.

Haitan strait separates Haitan island from the mainland; it is about 20 miles in length and $1\frac{6}{10}$ miles in width at its narrowest part, but it is much occupied by numerous small islets, rocks, and shoals.

Navigability.—Steam vessels drawing 22 feet use Haitan strait; it is unadvisable for a vessel of deeper draft to take it, as in case of there being delay from any cause she would probably ground, nor is the strait recommended for sailing vessels.

Tatong island, the nearest part of which is ½ mile northwestward of Haitan island, is about 3 miles long east and west, 1 mile broad, and 750 feet high. The channel between the islands is deep, but there are several islets and shoals in it.

Shoal.—At $3\frac{3}{10}$ miles northeastward of Tatong point is a rocky reef awash at high water.

Dori island lies 700 yards northwestward of Tatong island, is about a mile across, and 576 feet high. The channel between Tatong and Dori islands should not be used for navigation.

Shoals extend about $1\frac{4}{10}$ miles southwestward of the southern point of Dori island, and also ½ mile westward of the island.

A patch of rocks, part of which dries 8 feet at low water, lies about 262° 1,600 yards from the southern point of Dori island, and the channel between this patch and Mitre rock is about ½ mile wide.

Shingan island, about 600 yards northwestward of Dori island, is 1¼ miles long northeast and southwest, and narrow. Shing rock, 95 feet high, lies 1 mile northeastward of Shingan; the rock and island are connected by a rocky reef. A 3-fathoms patch lies ¼ mile northeastward of Shing rock. The soundings in the channel between Dori and Shingan islands are irregular, varying from 2¼ to 14 fathoms.

Simpson spit extends about 349° for nearly 2 miles from the northern end of Shingan island and across the north entrance to Haitan strait; it is sandy, with general depths of 4¼ to 5 fathoms over it, but the least depth is a 2½-fathom patch situated on its northeastern side at 307° 1,400 yards from the northern end of Shing rock. At about 287° ½ mile from the 2½-fathom patch is a 3¾-fathom patch.

Cows horn, 1,260 feet high, is a remarkable peak, situated on the mainland at 351° $4\frac{6}{10}$ miles from the summit of Slut island.

Slut island, about 1 mile westward of Shingan island, is 170 feet high, and foul ground extends nearly 3 miles north-northeastward of it.

The summit of the island, as seen from the southward, is a bowlder painted white with a vertical black stripe in the middle.

Beacons.—There are 2 beacons, 300 yards apart, on the southeastern slope of Slut island, each being surmounted by a triangular-shaped top mark painted white with a vertical black stripe in the middle; the top mark on the northern beacon is base upward, that on the southern base downward. The beacons, the summit of the island, and the middle of Cows Horn peak, in line bear 361°.

A white stone beacon has been erected between the leading beacons on Slut island, and when in line with the southern beacon appears to have a black vertical stripe painted on it.

A shoal, on which the steamship *Kwong-sang* touched when drawing 17 feet, exists in the northern entrance to Haitan strait in a position from which the Slut island beacons are in line bearing 351°, and the summit of Dori island 54°, distant nearly 2 miles. The shoal is shown on the chart as having a depth of 2¼ fathoms over it.

Red rock, 30 feet high and surrounded by foul ground for about ½ mile, is 39° $4\frac{3}{10}$ miles from the northern point of the western part of Tatong island, between which point and the rock is a line of islets and shoals.

Waif rock lies 2⅕ miles eastward of Red rock; is 48 feet high; rocks extend about 800 yards southwestward of it and 200 yards around it, except on its northern side.

Norton rock lies 39° $3\frac{6}{10}$ miles from Waif rock; is 52 feet high; a rock lies 200 yards northwestward of it. A patch of 6 fathoms, with 11 to 12 fathoms around, lies 329°, ½ mile from the rock.

Warning rocks lie about 4 miles northeastward of Syang point; are a group of rocks, the northeastern and highest of which is 107 feet in height. The rocks extend about 1 mile northeast and southwest. There is deep water between the northeastern rock and Bassett rock.

A rocky reef, part of which dries 3 feet, lies about 1 mile southwestward of Warning rocks. Within the 10 fathoms line the foul ground extends 1 mile northwest and southeast, and about 600 yards northeast and southwest.

Caution.—The northern coast of Haitan, between Warning and Red rocks should not be approached, there being numerous reefs off it.

Bassett rock, 32°, 1½ miles from the northeastern Warning rock, is a pinnacle rock with a depth of 19 feet over it.

Syang point, 345°, 2¾ miles from the northern point of the Kiun shan promontory, is the northeastern extreme of Haitan island; rocks and shoals extend eastward to Triplet rocks.

Long islet, almost midway between Syang point and Tatong point, the northeastern point of Tatong island, is 165 feet high.

Triplet rocks lie about 2 miles east-northeastward from Syang point; are 3 rocky islets, the highest of which is 134 feet high. There is deep water northeastward of these rocks.

Cust island lies about 1½ miles southeastward from Syang point and is 170 feet high; a rock 97 feet high lies close northwestward of it, and a group of rocks 600 yards southwestward.

Channel rock, or islet, lies about 1 mile northeastward of the northeastern point of the Kiunshan promontory. Rocks drying 13 and 20 feet lie 600 yards southeastward and northwestward of its southern end.

A reef of rocks extends north-northeastward 1,200 yards from a point ½ mile eastward of the northern point of the Kiunshan promontory, and at ½ mile northward of the end of the reef is a small group of rocks drying 6 feet.

Kwing island is 1 mile northward of Tan point, the most eastern point of Haitan, and it reaches in Sharp peak in its southeastern part a height of 446 feet. The channel between it and Haitan island is obstructed by reefs, and the swell rolls onto the Haitan coast. Parry islet, 257 feet high, is westward of Kwing island and between it and Haitan island; the tidal streams, however, run through the channels with such rapidity that they should not be used.

Kwing bay—Rocks.—A rock, which dries 6 feet, is situated at a distance of 2,280 yards 294° from Tan point.

A rock with a depth of 2½ fathoms over it is situated at a distance of 2,100 yards 312° from Tan point. At a distance of 300 yards 184° from this rock there is a rock which dries about 10 feet.

Vereker rocks are two pinnacles; the northwestern rock, 51°, 2 miles from Sharp peak, has a depth of 13 feet over it; the southeastern rock, about 109° 600 yards from the northwestern rock, has a depth of 19 feet over it.

Dawson rock, 110° 1½ miles from Sharp peak, is a pinnacle with a depth of 24 feet over it.

Tan point, the southern extreme of Kwing bay, is a low cliff with a mound at the back; at 1 mile eastward of it are Tan rocks, 2 of which dry 10 and 15 feet.

Tidal streams.—In March, off Tan point, the flood stream sets southwestward and the ebb northeastward 2 to 2½ knots an hour.

Haitan bay, between Tan point and Hai head, 195°, 7 miles from it, is a deep sandy bight with numerous islands and rocks in it; several of the latter are covered at high water.

Bown Rock, in the northern part of Haitan bay entrance and 187° $2\frac{4}{10}$ miles from Tan point, is a pinnacle drying 6 feet with 11 fathoms close around.

Lochinvar islets lie off the northern part of Hai head; there are rocky reefs for about 600 yards northward and southward of them; the passage inside the islets is foul.

Beal rock, 82°, 1,300 yards from the northern end of the largest Lochinvar islet, is a pinnacle with a depth of 10 feet on it.

Hai head lies about 1¼ miles southwestward of Lochinvar, and is 202 feet high; eastward of it are several islets, of which Chinsu is the largest, joined by a reef uncovering at a quarter ebb. A 5-fathom coral patch of small extent lies 130° 550 yards from the southeastern point of Chinsu islet.

Hai tan shoal, 118°, 2 7/10 miles from Hai head, is 1,000 yards long northeast and southwest, 600 yards broad, and has depths of 6 to 10 fathoms on it. At low water there is a very heavy tide rip, and the water is much discolored over the bank.

Turnabout island (Kiu shan), 106°, 4¾ miles from Hai head, is about 218 feet high; there are 2 small islets off it.

Light.—A round black light-house, 54 feet high, on the summit of Turnabout island, exhibits at 257 feet above high water an intermittent white light, thus: Light, 13 seconds; eclipse, 2 seconds; visible 23 miles.

The keeper's dwelling and wall are painted white.

Fog signal.—In answer to a vessel's fog signal, 2 guns are fired with 3 minutes' interval between them, and if the vessel's fog signal continues to be heard the signal is repeated after an interval of 10 minutes.

Position.—Lat. 25° 26′ 10″ N., Long. 119° 56′ 7″ E.

Sunda rock, 700 yards northward of the northern point of Turnabout island, dries 3 feet at low-water springs, and there is foul ground between.

A rock, awash at low-water spring tides, lies 300 yards southward of the southern point of Turnabout island.

Turnabout island should not be approached within ¾ mile; several steam vessels have been hazarded by rounding the southern point of the island too closely.

Currents.—At about 3 miles northward of Turnabout island the currents are rapid and irregular.

Shoal.—In March, 1905, a sounding of 12 fathoms gravel, sand, and shells was obtained from the steamship *Manchuria* at a distance of about 22 miles to the eastward of Turnabout island, in approximately Lat. 25° 29′ N., Long. 120° 20′ E.

Dwarf anchorage, westward of Hai head, is clear of rocks, with the exception of a rocky reef drying 10 feet, situated 299° 400 yards from Dwarf point. This anchorage is much used by steam vessels unable to proceed against the northeast monsoon; it is safe as far as holding ground is concerned, but during the northeast monsoon a very high swell sets into it, particularly at certain times of tide, which causes a vessel at anchor to roll very heavily. A good position is in 5¼ fathoms, sand, with Turnabout light-house just open of Dwarf point, bearing 106°, and Camfield point 7°; or for a small vessel in 3½ fathoms, sand, with Dwarf point bearing 114°.

Rambler bay, in which there are several detached rocks, is between the northeastern part of Haitan point and Trite island; and there is well-sheltered anchorage during the northeast monsoon northwestward of Trite island.

Trite island, 55° 3 miles from Haitan point, is 90 feet high, with three peaks, and detached islets and reefs extend northwestward of it.

Peiyang shoal, of 2½ fathoms, but on which there may be less water, was reported in 1895, and from it Trite island bears about 310°, distant 1 mile approximately.

South reef, 171° 2¼ miles from Trite island, dries 13 feet at low-water springs and the sea breaks heavily on it.

Haitan point, the southern end of Haitan island, is a rugged sandy headland, 330 feet high, with several rocks, 15 to 35 feet high, off its southwestern side. A sunken rock lies 220° ¾ mile from the point.

North entrance—Haitan strait.—Returning to the North entrance, the obstructions in the strait to the southward are as follows:

Mitre rock, which lies 1,400 yards southerly of Slut island, is 20 feet high.

Three rocks, which lie 1⅘ miles southerly of Dori island, are 2 to 6 feet high, the eastern rock being the highest.

Inner rock, 1,200 yards eastward of the eastern of Three rocks, is 30 feet high.

Tower rock lies 1,400 yards southerly of Three rocks, and is 28 feet high, flat, with a deep embrasure in it; a smaller rock lies 200 yards westward of Tower rock.

Tricker rock lies 152° 3⅕ miles from Tower rock, and dries 20 feet; some rocks lie within 200 yards southeastward of it, and a 2-fathom patch at 152°, nearly 400 yards.

Charles island lies 1,200 yards southeastward of Talisman Peak peninsula, is 49 feet high, and has a large bowlder on its summit.

Rocky islands, ¾ mile southward of Charles island, are 26 to 33 feet high.

Black rocks, ½ mile eastward of Charles island, are 20 feet high.

Middle island lies 128° 2⅓ miles from Black rocks; is 61 feet high; there are 3 rocks close northeastward of the island, the eastern of which is 86 feet high.

At 1,400 yards southwestward of Middle island is a group of rocks, 1 of which dries 8 feet.

Town point is 81° 1¾ miles from Middle island, and from it the the land trends eastward to Haitanchin town. At 80° 3½ miles from Middle island is a white sand hill, 171 feet high, and at 11° $4\frac{7}{10}$ miles from Middle island is Pillar rock, 90 feet high, westward of which is an islet 40 feet high.

Flag island lies 200° 1⅘ miles from Middle island, and is 68 feet high; reefs extend northward 300 yards and southward 700 yards from the island; the eastern and western sides may be passed at the distance of 200 yards. From 800 yards southwestward to 600 yards northwestward of this island are detached mud and sand banks forming the western edge of Wilson channel entrance.

Quoin hill, on the mainland at about 1⅔ miles south-southwestward of Flag island, is 330 feet high, and on northerly or southerly bearings is wedge shaped. Tyneyungshan peak, 1,200 yards westward of it, is a remarkably steep hill, 962 feet high.

Pass island, 128 feet high, lies about 1¾ miles southerly of Flag island; northwestward of Pass island and joined to it by a narrow ridge of bowlders and gravel is Little Pass island.

A sand bank and shoal water extends southward from Pass island; its 3-fathom limit bears about 246°, 1,300 yards from Junksail islet.

Beacons.—There are two beacons on the northern slope of Pass island, each being surmounted by a diamond-shaped topmark, the northern white with a black central part, the southern black with a white central part. The beacons in line bear 159°.

Pass rocks, 400 yards northeastward of Pass island, dry 20 feet; there is a narrow and deep passage between the rocks and the island, but it is not recommended.

Beacon.—An iron tripod beacon, surmounted by a spherical cage 6 feet in diameter, has been placed on the northern end of Pass rocks. The total height of the beacon is 26 feet, and at least 12 feet of it is above high water. The beacon, with the cage, is painted black.

Low islet, ¾ mile northeastward of Pass island, is 33 feet high, and a rocky ledge extends 300 yards southward of it.

Ashuelot rocks are two pinnacles, lying east and west, distant 65 yards from each other. The western pinnacle 255° 400 yards from the southwestern end of Low islet, has 4 feet over it at low water spring tides, with 6 fathoms close around. The eastern pinnacle has 1½ fathoms over it with 6 fathoms close around. A detached rock with 3¼ fathoms over it lies 100 yards northwestward of the western pinnacle; at low water these rocks are well marked by tide overfalls.

The western point of Station island in line with the eastern point of Junksail islet 135° leads through the channel between Ashuelot and Pass rocks.

Junksail islet lies about 1 mile southeasterly from Pass island, is 39 feet high, and foul ground extends 200 yards westward of it. The extreme of a mud and sand spit, steep-to, projecting from the island side of the strait, lies 165° 600 yards from this islet.

Station island, 3½ miles northwestward of Haitan point and ½ mile off Haitan island, is 59 feet high, and often difficult to make out until close-to, but there is a remarkable triangular white-sand patch on Haitan island ¾ mile northward of it. Owing to Station island sloping considerably, as well as the great rise and fall of tide, it appears nearly double the size at low to what is does at high water.

A quarter of a mile eastward of the white patch a steamship was beached and repaired after striking Sunda rock; there is a more sheltered position northward of Edmond reef.

Position.—The observation spot on Station island is in Lat. 25° 25′ 16″ N., Long. 119° 42′ 22″ E.

The coast of Haitan island between Haitan point and Station island is shoal with detached reefs, and it should not be approached within 1¼ miles.

Edmond reef, 298° 800 yards from Station island, dries 15 feet; and a reef 174° 600 yards from the same island, dries 20 feet. The channel at about 1 mile southeastward of Young island, between the 5-fathom contour lines, is narrowed to about 1,000 yards by the banks extending from Young and Station islands.

Chim island, at the junction of South and Southeast entrances to Haitan strait, is the highest island in this locality, and rises with sloping sides into 2 peaks, the higher, on which there are 3 chimneys, being 769 feet above the sea. It is separated from Sand island to the southward by a channel 1,400 yards wide, in which there are several islets. North Chim rock, 18 feet high, lies 124° 2 miles from the southeastern point of Chim island; there is a rock about 200 yards northeastward of it. Chim rock, 176° ¾ mile from North Chim, is 42 feet high.

HAITAN STRAIT—DIRECTIONS FROM THE SOUTHWARD.

Southeast entrance.—After rounding Hai head, pass 600 yards southward of Trite island, using caution to clear Peiyang shoal and South reef, when steer to pass about 1 mile southward of Haitan point, and thence about 279° until Junksail islet bears 354°.

From the southwestward, steer for a position about 1 mile east-northeastward of North Chim rock; then steer northwestward to about ½ mile northeastward of Chim island, and keep westward, passing about 600 yards northward of that island, until Junksail islet bears 354°.

South entrance.—From the southward, pass 1 mile eastward of Scattered Yits, half a mile eastward of Double Yit, and steer for No-pass rock, bearing 340°, until the southern end of Sand island bears 111°, then steer for the sand patch on Haitan island, just northward of Station island, bearing 27° until Junksail islet bears 354°.

From Hunghwa channel, after passing White island, keep that island just open northward of Wilshere island 279°, and when Douglas islet bears 345°, steer 27° for the sand patch on Haitan.

Haitan strait.—Keep Junksail islet bearing 354° until the islet eastward of Young island bears 269°, when steer about 336° and pass 800 yards westward of Junksail islet.

Thence steer to pass about 400 yards eastward of Pass rock beacon, Low islet being a little on the starboard bow, until the eastern end of Junksail islet and the western end of Station island are in line bearing 135°; keep this mark on astern until Quoin hill is in line with Tyneyungshan peak bearing 259°, and the beacons on Pass island are also in line.

Wilson channel.—Under all circumstances this channel is the best. Keep the Pass island beacons in line, astern, bearing 159°, until the southern end of the middle Rocky island is in line with a fort on the western shore bearing about 281°, when steer to pass about 600 yards eastward of Black rocks. Continue northward with Cow's horn in line with the left shoulder of Slut island, bearing 352°, until Inner rock bears 89°, then bring and keep the beacons on Slut island, the summit of that island, and Cow's horn peak in line, 351°, until Mitre rock bears 269°.

Blind channel (formerly known as Collinson channel); proceed northward with the eastern end of Junksail islet in line with the western end of Station island until Low islet bears 79°, then steer to pass 500 yards eastward of Flag island.

From this position steer 329°, allowing for the tidal stream, and bring the eastern end of Flag island in line with the western end of Pass island 170°.

Keep this mark on astern, and when Sand hill opens northward of Middle island group, bearing 84°, edge eastward until the eastern end of Flag island is in line with the western end of Little Pass island, 174°, which mark keep on astern until Pillar rock bears 34° (Tricker rock, if sufficiently above water, may be seen in line with it), or Charles island is in line with the Pagoda, 244°, then steer northwestward across the middle ground in a least depth of 2¼ fathoms, and bring Cow's horn in line with the left shoulder of Slut island, 352°, whence as above.

North entrance.—From east of Mitre rock steer about 20°, and pass midway between Slut and Shingan islands; then bring Mitre rock midway between Slut and Shingan islands and in line with a dip in the hills beyond, bearing 244°, which leads through North entrance and over Simpson spit in 4½ fathoms, midway between the 3¾ and the 2¼ fathom shoals, where the leading mark must be carefully preserved.

When the northern end of Shing rock bears 159° steer to pass southward of Tessara islands.

The least depth of water passed over in the above route is 15 feet at lowest springs, situated at about 3½ miles northward of Pass island.

Directions from the northward.—Reverse the above directions.

Anchorages.—There is good anchorage in 4 fathoms, sand, with Station island bearing 72° and the western end of Junksail islet 331°.

In Maiangkun bay in 6 fathoms, mud and sand, with Junksail islet and Low islet in line 151° and Quoin hill 252°.

In the northern part of Wilson channel in 7 to 10 fathoms, mud and sand.

Wind.—In the northeast monsoon when the wind in the strait has the force of a gale, at the north entrance it is often moderate.

Tides and tidal streams.—It is high water, full and change, in Haitan strait, during the northeast monsoon at 11h. 23m.; springs rise 20 to 23 feet, neaps 16 feet. The rise at full moon springs is 3 feet greater than that at new moon springs.

The flood stream enters Haitan strait by both the northern and southern entrances; these streams meet between Rocky and Middle islands, in which vicinity, and more especially between Hill and Middle islands, there are, with strong winds, heavy overfalls, dangerous for boats. The ebb streams separate between Rocky and Middle islands and run out by both the northern and southern entrances.

In the Pass, the stream runs in the direction of the channel 4 to 5 knots an hour, but in the more open portions of the strait, from 2 to 3 knots.

The flood stream entering Haitan strait by the Southeast entrance, divides northward of Chim island, one portion flowing northwestward and the other southwestward.

Sand island, 1,400 yards southward of Ming island, is a remarkable white island, with sandy beaches and detached hills. Rocks extend 1,400 yards off the southeastern side of Sand island.

Rocks, some above water, and foul ground extend about 151° from 1,400 yards to 1½ miles from the southern point of Sand island.

Reef island, about 2¾ miles southeastward of Sand island, is 192 feet high. Bent island, 165 feet high, is ½ mile westward of it, shoals lying between; and rocks above water and reefs extend ¾ mile southwestward from Bent island. Reefs, partly above water, the extreme of which is Long reef, extend 1,400 yards northward of Reef island. An islet, 101 feet high, lies 400 yards eastward of Reef island, with which it is connected at low water; and rocks and reefs lie nearly ½ mile off the southeastern side of the island.

Breaker rock, which dries 9 feet, lies 1,700 yards southward of the southern point of Reef island. There is foul ground about 600 yards around the rock to the northward.

Comet rock, 201° $1\frac{4}{10}$ miles from the southern point of Reef island, has 6 feet over it.

Sentry island, about 1¾ miles southwestward of Reef island, appears as two small islands on westerly bearings.

Rock.—A rock, with 3 fathoms water over it, lies 279° $1\frac{2}{10}$ miles from the southern end of Sentry island.

Sedan rock, 127° $2\frac{4}{10}$ miles from the southern end of Sentry island, is of small extent, with 11 feet water over it, and 11 to 13 fathoms around.

Tidal streams.—At Sedan rock in March and April the flood stream set southwestward and the ebb southeastward, 2 to 2½ knots an hour.

Vangan point is the western entrance point to Haitan strait. About 1¾ miles to the westward of Vangan point lies Kerr island, which is ¼ mile off the mainland and 131 feet high. South Kerr island, about 600 yards southeastward of Kerr island, is 54 feet high, round, and bare. A reef stretches southward from the Kerr islands, having near its outer limit a detached rock which dries 8 feet and bears 213° distant 800 yards from South Kerr island.

A 3-fathom patch of small extent lies 1,400 yards 135° from South Kerr island.

Punchard islet, 64 feet high, and an islet close southwestward of it, lie nearly 400 yards offshore and 1,600 yards eastward of Kerr island. Douglas islet, 50 feet high, is 1,200 yards southward of Vangan point; No-pass rock, 15 feet high, is 94° 1,200 yards from the point; the channel between the rock and the mainland is not recommended.

Tides.—It is high water, full and change, at Kerr island at 11h. 23m.; springs rise 24 feet, neaps 18 feet.

Volga rock, 183° 1,200 yards from Douglas islet, has 4 feet over it. The tidal streams and ripplings are very strong in the vicinity of this rock.

Anchorage.—There is good anchorage during the northeast monsoon eastward of Kerr island in 5 fathoms, mud, with Punchard islet bearing 325°, distant 800 yards, but the bottom is uneven.

Hunghwa channel is bounded on the northern side by the islands and reefs off Vangan point and by Sand, Sentry, and Reef islands.

Directions.—Entering Hunghwa channel from the eastward, give a sufficient berth to Comet and Sedan rocks, then pass between Double Yit and Sentry islands, southward of Sand island, with the shoals and detached 3-fathom patch southward of it, and the rocky islets and rocks off Vangan point.

The Eighteen Yits, lying northeastward and eastward of Lam Yit island (which is one of them), are small islands extending over a space of 10 miles.

Navigation among the Yits must not be attempted, as the ground is uneven and uncharted rocks may exist. The tidal streams are strong and variable.

Triangle Yit, 108° 1¾ miles from High Cone peak on Lam Yit, is 230 feet high.

Cap Yit, 4½ miles east-northeastward of High Cone peak, is 225 feet high; Double Yit, 1¾ miles northeastward of Cap Yit, is 105 feet high, and on the southern side of Hunghwa channel, which between Double Yit and Sentry island east-northeastward, is 3 miles wide. Scattered Yits, 1½ miles southeastward of Cap Yit, are three rocks, the southern of which is always above water, with deep water around them.

Long Yit, 1½ miles westward of Double Yit, is 173 feet high, and Northeast Yit rock, 1½ miles northwestward of Long Yit, is about 10 feet high; both are steep-to, and on the southern side of Hunghwa channel.

Hongkong rock lies ½ mile northeastward of Long Yit; at low water, the boilers of a wrecked steam vessel, if they still exist, are visible; otherwise there is no indication of shoal water.

Hung rocks, about 84° 2½ miles from North Yit rocks, are ½ mile in extent, 99° and 279°; the western rock dries 4 feet and the eastern 8 feet.

Chim island summit, in line with South Kerr island 69°, leads northward, and Cliff island open northward of Red Yit island 261° leads southward of Hung rocks.

Red Yit rocks.—The northern rock lies with Red Yit summit (324 feet) bearing 258° distant 1,100 yards; and the southern rock 400 yards southeastward of the northern rock; both rocks dry 4 feet.

North Yit rocks are a cluster of rocks 700 yards in extent, lying 1,400 yards north-northwestward of Red Yit; one of the western rocks dries 13 feet, and two of the eastern 2 feet and 4 feet, respectively.

Triangle Yit—Rock.—A rock, which dries, is reported to exist nearly in the center of the channel to the westward of Triangle Yit, in a position from which the summit of that island bears 80°, distant 1 mile, and High Cone 314°.

White island, about 1½ miles northward of Hung rocks and near the center of Hunghwa channel, is 130 feet high, round and bare.

Tides.—It is high water, full and change, at White island, Hunghwa channel, at 11h. 25m.; springs rise 23 feet.

Rugged island is about 4 miles west-northwestward of White island and is 350 feet high.

Wilshere island, 800 yards southerly of Rugged island, is 86 feet high; a rock, 3 feet high, lies about 200 yards southward of the island, and a rock, which dries 13 feet, about 100 yards southward of its southwestern point.

Anchorage may be obtained at 400 yards westward of Wilshere island in 12 fathoms, mud, out of the strength of the tidal stream.

In the passage between Wilshere and Rugged islands, at 400 yards northeastward of Wilshere island, lies a rock which dries 12 feet.

Passage islands, about 1,200 yards southerly of Wilshere island, are three in number; Gough island, 95 feet high, the northeastern island, is conical, cliffy, and steep-to on its northern side. A reef, drying 13 feet, extends 400 yards westward of the western Passage island; rocky reefs, parts of which dry 13 and 21 feet, extend 350 yards southward of the southeastern Passage island, and from the southern end of these reefs a bank, with depths of 15 to 6 feet and on which is a rock 1 foot high, extends eastward 1 mile.

Douglas rock, 159° 1,300 yards from the southern end of the southeastern Passage island, is a pinnacle of very small extent, with 4 feet over it at low water. A rocky patch about 800 yards in extent, with depths of 2 to 4¾ fathoms over it, lies southward of the rock; and a rocky reef, which dries 13 feet, and with shoal water 300 yards northeastward and 100 yards southwestward of it, lies 169° 1⅒ miles from the southern end of the southeastern Passage island.

Lamyit island, the southern and largest of the archipelago named the Eighteen Yits, is 7 miles long, southeast and northwest, and fronts the extensive inlet, Hungwha sound. The eastern peak, High cone, 565 feet above the sea, is the highest point of the island.

The southern point of Lam Yit is a bold table-land, 530 feet high, and off it, and connected at low water, is South Yit islet, northwestward of which is a snug and excellent anchorage in 7 to 10 fathoms during the northeast monsoon.

At 89° ½ mile from South Yit is a rock.

Pass ½ mile southward of the islet and then haul up into the bay, anchoring directly the water shoals. At 2 miles northwestward from South Yit is a flat rock above water, and 800 yards southward of this rock is a reef awash at low tide.

Duke reef lies about 1¼ miles off shore, with the southern extreme of South Yit 118° nearly 2¼ miles; it is 150 yards long by 100 yards broad and covers at high-water springs, but breaks with any sea at low water.

To clear the rock and reef northwestward of South Yit and Duke reef, keep within 1½ miles of South Yit, should the vessel not fetch into smooth water after rounding it.

A sand bank extends 2¼ miles southward from the southwestern point of Lam Yit island; it is subject to change, but it is marked by discolored water.

Fort hill point, the southern entrance point of Hunghwa sound, is 3¼ miles west-northwest from Lam Yit. Rocks and foul ground lie off the point.

Clam islet lies 1½ miles east-southeastward of the point, and Haystack rocks are westward of the islet.

A rocky patch of 1¾ fathoms is situated with its southeastern edge at 194° 2 miles from Clam islet. There is generally a less depth than 5 fathoms between a line drawn 193° 5 miles from Clam islet and the main.

Cliff island, about 1 mile northward of the northern point of Lam Yit, is 97 feet high and precipitous; a reef, 400 yards northeast and southwest, which dries 13 to 15 feet, has its western end 400 yards 64° from Cliff island, and a reef, which dries 9 to 12 feet, lies 600 yards southeastward of the island. A quarter of a mile westward of Cliff island is a bank about 1 mile long, northwest and southeast, and ½ mile broad with general depths of 3½ to 4½ fathoms; near its southwestern edge there is a depth of 15 feet.

In the channel between this bank and Cliff island there are 7 to 15 fathoms.

Hunghwa sound extends northwestward about 14 miles from Lam Yit island, and has a general width of about 9 miles; there are islands and rocks in it, the principal of which are near the entrance points. The only passages that should be used to enter or leave it are Lam Yit and Hunghwa channels.

Pilots can be obtained at Chinchu.

Directions.—To proceed eastward through the channel southward of Cliff island and North Yit rocks (formerly used by native pilots) pass the islet, 40 feet high, which lies northeastward of Lam point, on its northern side at the distance of about 200 yards in 8 fathoms, and the islet, 25 feet high, ¾ mile northeastward of the 40-foot islet, on its southern side, at the distance of 50 to 100 yards in 4 fathoms; the 40-foot islet is steep-to on the northern side, but a reef extends 200 yards from the southern side; the 25-foot islet appears to be steep-to on the southern side.

Near the northern point of Lam Yit island the channel shoals to 3 fathoms; pass this point at the distance of 600 yards and steer for the northwestern extreme of Red Yit island, giving a fair berth to the northern of the islets which lie between Lam Yit and Red Yit. On closing the northern point of Red Yit keep the 40-foot islet just open northward of the northern point of Lam Yit, which leads between North Yit rock and the shoal water off Red Yit.

The channel between Passage islands and Wilshere island is 900 yards wide, with a depth of 12 to 20 fathoms; after passing the 40-foot and 25-foot islets (northeastward of Lam point), at about 400 yards distant, steer with Griffith island summit in line with western point of Rugged island, 358°, until Gough island bears 89°, when steer eastward through the fairway between the rock, 3 feet high, southward of Wilshere island and Gough island. Then steer to pass on either side of White island.

The channel between Passage and Cliff islands should not be used except in emergency, owing to the rocks and shoals in it. To use this channel pass 300 yards westward of Cliff island, steering 358°, with Griffith island summit in line with the western point of Rugged island, until the northwestern extreme of Gough island is in line with the southeastern extreme of West Passage island, 36°; keep this mark on until the western extremes of Wilshere and West Passage are in line, then steer about 87° through the passage.

Tidal streams.—A portion of the flood stream entering Southeast entrance of Haitan strait turns southwestward round Chim island. It divides southward of Volga rock, one part flowing through Hunghwa channel, and the other through the numerous passages between Rugged and Lam Yit islands to Lam Yit channel.

The flood stream in the channels between Rugged and Red Yit islands runs 5 to 7 knots an hour at springs, setting fairly through the passages; there are frequently heavy overfalls and chowchow water; steam vessels of moderate power should be prepared to go full speed in these channels. In March between Red Yit island and North Yit rocks an eddy tidal stream has been experienced, the flood running northeastward, and the ebb southwestward, 2 or 3 knots an hour.

Lam Yit channel is between Lam Yit island and Clam islet and the shoals southward of it.

When entering the channel from the eastward, especially with the flood stream, give a wide berth to the bank extending southward from the southwestern point of Lam Yit island, and to clear its western edge keep Lam point eastward of North.

Anchorage.—There is good shelter southward of Lam point, where the junks anchor. The outer rock off the point always shows, and may be rounded close-to; but it must not be brought westward of 339°, as the water shoals suddenly, and there is a sunken rock in the bay at 1,200 yards southward of Lam point. The best position is as close to the point as the vessel's draft permits. There is also anchorage in 4 or 5 fathoms at 1½ miles northward of the point.

Directions.—To proceed through Lam Yit channel for the entrance of Hunghwa river, which flows into the western part of the sound, steer northward 7 miles from Lam point, then steer for Pitiu point, passing 1 mile northward of Knob island.

Patches of rocks lie northwestward of Knob island, the eastern of which lies 348° 1,600 yards from the island, and the northwestern 309° 1¾ miles; some of the rocks are always above water. There is a patch 2 miles east-southeastward of the southeastern corner of the fort on Pitiu point. Good anchorage in 6 fathoms can be obtained with this corner of the fort 66°.

The entrance to Hunghwa river, leading to the town, bears 263° from Pitiu point; the depth shoals to 6 feet at low water at 5 miles from the fort.

Coast.—The coast from Fort Hill point to Ping rocks, a distance of 8½ miles, trends southwestward; between these points is a small bay only partly surveyed. Rocks and foul ground lie off this stretch of coast.

Loutz island, 70 feet high, is about 114°, 5¼ miles from Ping rock, and between them, at 1¾ miles from Loutz, are two sunken rocks, named Loutz shoal. A rock awash at low water is reported to lie with Loutz island summit bearing 90° distant 1,400 yards; its position is doubtful. Caution must be used in this vicinity in which other dangers may exist.

An islet, 20 feet high and peaked, lies 1¼ miles northeastward of Loutz island, and 400 yards north-northwestward of the islet is a half-tide rock, and another lies 187° 1,600 yards from the islet.

Shoal.—A shoal, on which the steamship *Titania* grounded, when drawing 17 feet, is situated about 1½ miles to the southward of Loutz island.

Ockseu islands are two in number and about ¾ mile apart; the northwestern and larger island is 237 feet high, round topped, with smooth sides, and lies 149° about 9 miles from Loutz island. The southeastern island is about 150 feet high, rather hummocky and sandy, with a large fishing village on it and detached rocks off its eastern and western points.

During the northeast monsoon anchorage has been obtained southward of the northwestern island, but as this vicinity has not been surveyed great caution is requisite.

Light.—A circular black tower, 64 feet high, on the summit of the northwestern Ockseu island, exhibits at 286 feet above high water, a revolving white light every minute, visible 24 miles.

The keeper's dwelling and wall are white.

In 1906 this light was reported as a fixed light at a distance of 10 miles.

Fog signal.—In answer to a vessel's fog signal three guns are fired with 2-minute intervals between each; and if the vessel's fog signal continues to be heard the signal is repeated after an interval of 12 minutes.

Position.—Lat. 24° 59′ 36″ N., Long. 119° 27′ 07″ E.

Route.—Steam vessels proceeding against the northeast monsoon, with clear weather, pass inside the northwestern Ockseu island, giving it a berth of 2½ miles. Between Ockseu and Tungyung guard against a strong inset during the flood.

Pinghai bay is 6½ miles wide at the entrance between Ping point on the east and Rowan islands on the west; it shoals gradually from

5 to 3 fathoms. Ping rock, 90 feet high and conical shaped, lies 800 yards southward of Ping point, and there is a sunken rock ¼ mile southwestward from it.

The anchorage in this bay is in 3 to 5 fathoms off Pinghai town. At 5 miles northwestward from the anchorage is a high range of hills, of which Marline spike peak is noticeable. The bay runs back past the foot of Marline spike range, but is shoal.

Pinghai bay is a good anchorage in the northeast monsoon.

Shot point, the northeastern point of Meichen island, is 5 miles north-northeastward of Rogues point, the southern point of the island; there are some rocks within about 1 mile from it, and Rowan islands lie off a point of the mainland at 1¼ miles farther northward.

Sorrel rock, 79°, 3¾ miles from Rogues point, is 60 feet high; a detached rock lies 150 yards southward of it, and there is shoal water for 600 to 800 yards northeastward of it.

Rogues point is clear, except on its eastern side, where there is a reef at 200 yards offshore; there are depths of 3½ to 4 fathoms at 600 yards from the sandy spit westward of the point. A patch of 5 fathoms lies 151° 1½ miles and a patch of 4¾ fathoms 179° 1½ miles from the point.

Ninepin rock lies 2¾ miles westward of Rogues point, and a reef extends from the Ninepin southward 1 mile to Square rock, one of a cluster of rocks above water; thence the reef extends southwestward 300 yards, and its outer part dries at low water; a reef extends 200 yards northward of Ninepin.

At 1,200 yards eastward of Ninepin is a patch of flat rocks awash at high water. Scout rock lies 281° 1¼ miles from Rogues point.

At 19° 1 mile from Ninepin is a rock dry at low water. There is a passage between this rock and Ninepin.

Saddle island lies 323° 3¼ miles from Ninepin.

Cliff islet is 19° 1 mile from Saddle island, and from its western point a sand bank extends northwestward 1¾ miles.

Anchorages.—There is good anchorage in the northeast monsoon between the patch eastward of Ninepin rock and Rogues point and also in 8½ fathoms with Ninepin bearing 180°, Rogues point 126°, and a small white rock off Meichen village 86°.

In the southwest monsoon there is good anchorage northwestward of Saddle island.

When approaching Saddle island pass southward of the southern islet off it and haul northward round the western islet, giving it a berth of 200 yards at high water to avoid a ledge. The ground is very uneven hereabouts, and there is only 2½ fathoms at 1 mile west-northwestward of the western islet.

The southern peak of Saddle island eastward of 145° leads westward of the bank extending off Cliff islet. When Mound peak, which is on the mainland and 3 miles northward of Saddle island, with a walled town and pagoda near it, bears 89° a vessel is northward of this bank and can haul in toward the town. At 286° 2½ miles from Mound peak is a knoll with only 6 feet over it.

The junks use the channel between Mound peak and Cliff islet and also pass between Mound peak and Meichen island. The former channel is deep, but requires local knowledge; the latter is strewn with rocks and in some places has not a greater depth than 9 feet.

Tides.—It is high water, full and change, in Meichen sound at 0h. 30m.; springs rise 17 feet.

Meichen sound entrance is between Rogues point, the southern end of Meichen island, and Gulai point, which bears 241° nearly 6 miles. The sound runs northwestward about 18 miles; it has only been partially examined and there are many rocks in it which are not marked on the chart.

Port Matheson (Gulai), the bay northward of Pyramid point, is 4 miles wide at the entrance between Gulai and Pyramid points, about 5 miles deep, and affords good shelter to vessels of light draft with winds northward of 66°, but it is quite open between 168° and 66°.

Sugarloaf hill, the highest on the northern side of the bay, is remarkable, brown, cone-shaped, and a good landmark. There is a group of islets in the northern part of the bay westward of Gulai point, and another group in the southeastern part; the western islet of the northern group is about 70 feet high; South islet about 120 feet. A rock lies 800 yards northward of the largest islet of the southeastern group.

From eastward of Pyramid point, Sugarloaf hill shows conspicuously, being the only conical-shaped hill in the vicinity.

Pyramid point, about 4 miles south by east of Gulai point, is the southern entrance point of port Matheson, and on westerly bearings it appears bold and black, but on northerly or southerly bearings it appears pyramidical.

Pyramid rock, connected with the point at low water, is about 60 feet high and surmounted by a conical building 20 feet high; southeastward of it is a rock above water. Reefs, mostly above water, extend about 1,200 yards eastward and southeastward of Pyramid point.

Anchorage.—There is anchorage for small vessels during the northeast monsoon in the first bay westward of Pyramid rock, sheltered to the eastward by the reef extending southeastward from the point, which forms a good breakwater. This anchorage is close inshore and a sunken rock lies 200 yards southward of the first point eastward of Tongbu town. The anchorage westward of the rocks off Tongbu is said to be better. Fish are plentiful.

Juno rock, 224° 1¾ miles from the western corner of Tongbu wall, is a cluster of rocky heads covered with coral, with 12 feet over it at low water, and 5 fathoms around.

Tongbu bay, southwestward of the point on which is Tongbu town, is a large open roadstead, affording anchorage in 7 to 4 fathoms, with good shelter in the northeast monsoon, but it is not recommended on account of the rocky character of its shores.

There is fair anchorage during the northeast monsoon in the little sandy bay immediately westward of Tongbu fort in 24 feet, mud, with the southwestern extreme of the islet off the fort 120°, distant 400 yards.

Chinchu harbor.—The entrance to Chinchu harbor is between the point on which is Tongbu town and Chungchi point, 9¼ miles southwestward, but the shores rapidly approach each other, so that its proper entrance may be considered to be not more than 4½ miles wide between Chungchi point and the point northward of it.

Navigability.—Owing to the shoal water in the entrance and the heavy swell which rolls in when there is any wind, the passage is dangerous at low water to vessels drawing over 10 feet. The channel near Seatoi islet is very narrow and great caution is necessary; shelter can be obtained by vesels of light draft northward of Tatoi island and Boot sand.

Pilots.—Chinchu harbor is the only place where pilots can be obtained for Haitan strait or Hungwha sound.

Takut island, ½ mile off the mainland on the northern side of the harbor and 29° 5½ miles from Chungchi point, is about 200 feet high, and there is a large town on it and a fort on its southern end. At 700 yards southeastward of it is a sunken rock.

White rocks lie about 1,800 yards southward of Takut island and are 20 feet high; the channel between is not safe.

Passage island, about ½ mile southwestward of White rocks, is 50 feet high, and has a scorched appearance; within ½ mile eastward of it are some rocks, which cover at high water; a ledge also extends nearly 400 yards southwestward from the island. A 19-foot patch lies 207° ¾ mile from Passage island.

Tatoi island, about 2½ miles westward of Passage island, is 358 feet high. Boot sand, which is extensive, trends westward from between Seatoi islet and Tatoi island to the entrance of Lokyung river. There is no passage between this sand and Seatoi islet.

Seatoi islet, about 1 mile southward of Tatoi island, is about 40 feet high and barren. Reefs extend 100 yards from its southern, southwestern, and eastern sides. Hewen rocks, above water, are ½ mile southwestward of it.

Seatoi bank, with 2¼ fathoms on it, extends about 2 miles eastward of Seatoi islet. There are frequently overfalls on this bank.

Lynx rock, 115° 600 yards from the eastern end of Seatoi, has a depth of 6 feet over it. Tahin rock, 169° 400 yards from the Lynx, shows at low water. The bottom between Tahin and Hewen rocks is rocky and uneven, with, in several places, depths of only 6 feet at low water. The highest part of Hewen rocks in line with Choho pagoda, 274°, leads about 100 yards southward of Tahin and a rather less distance northward of a 6-foot patch.

Mid-channel reef lies between Seatoi islet and Hewen rocks, and 3 of its rocks show at low-water springs.

Choho point, 306° 3¾ miles from Chungchi point, has a pagoda on it 230 feet above the sea. A sand spit extends eastward nearly 1¼ miles from Choho point, and from a reef on its northern edge the pagoda bears 229°, distant 1,200 yards.

Ota rock, 309° 1⅒ miles from Choho point, covers at high water; Pisai island lies 800 yards westward of it, and there is a sand bank between.

Tides.—It is high water, full and change, at Pisai island at 0h. 25m.; springs rise 17 feet.

Directions.—From about ¾ mile southward of Passage island steer in with Choho pagoda 261° until Tatoi island peak bears 342°, then steer to pass 300 yards eastward of the eastern point of Seatoi. Run along the southern side of Seatoi at the distance of 100 yards, and when its western hummock is on with Tatoi peak the vessel is northward of Mid-channel reef and in the narrowest part of the channel, which is barely 200 yards across.

Then steer 289°, keeping Pisai island westward of 286° to clear the reef of Choho point, and not bringing Seatoi southward of 106° to clear the southern edge of the Boot; this bank, however, is generally visible. When northward of Choho pagoda anchor in about 10 fathoms, or proceed, using the chart as a guide, to the anchorage about 1½ miles northward of Pisai, where the channel is 600 yards wide.

Formerly the opium vessels passed between Lynx and Tahin rocks, with the southern extreme of Seatoi islet in line with the northern extreme of Pisai.

To anchor northward of the Boot, pass northward of Tatoi island, and a vessel of light draft may run up until Choho pagoda bears 196°, where there is smooth water in any weather, as the Boot forms an excellent breakwater. White rocks southward of 90° lead northward of the Boot. A sunken rock lies 300 yards off the northern shore, 342° from Tatoi peak.

There is good anchorage in northeast or northerly gales in 3½ fathoms with Tatoi peak 145°, but in a southwesterly gale the former anchorage is to be preferred.

The entrance of a small river is 3 miles 299° from Pisai island. On the left bank, at the entrance, is a circular fort, and 4 or 5 miles above it on the same bank is Chinchu city. The channels to the town are shoal and intricate, and large junks wait near Pisai for tide before crossing the flats, which are covered with artificial oyster beds.

Chungchi point, about 400 feet high, has sunken rocks extending 600 yards southeastward from it.

The coast from Chungchi point, the southern entrance point to Chinchu harbor, to Junk head trends southwestward for 7 miles. Several sandy bays between these points afford shelter to junks, but numerous rocks and reefs extend for about 1,200 yards off their shores, and no attempt to enter them must be made without local knowledge.

Bell islet, at 1½ miles southward of Chungchi point, is 30 feet high and has a bell-shaped building; it does not show out well.

Yungning islet, close off Yungning point, which lies $1\frac{3}{10}$ miles southwestward of Junk head, is about 15 feet high, flat, and steep-to. A reef lying 265° 600 yards from it covers at high water.

Junk head is $1\frac{3}{10}$ miles northeastward of Yungning point; Fairy rock lies 600 yards off the head, and shows at low water.

Chimmo bay, the entrance of which is between Yungning point and Chimmo point, 205° 2¾ miles from it, is about 2½ miles in depth. Its shores are barren, but populous, and the walled town Yungning is on its northern shore. The bay is quite open southeastward and is dangerous in the southwest monsoon.

Kusau hill and pagoda, which is 760 feet above the sea and 1¾ miles from the beach on the northern side of the bay, is the most conspicuous land on this coast, and a fine landmark from the offing in hazy weather; northeastward and separated from it by a deep gap or valley is a double-topped hill of nearly the same height.

Sour and Pagoda islets lie about 1,800 and 800 yards northeastward of Chimmo point; the channels between them and between Pagoda and Chimmo point are full of rocks. A reef extends about 600 yards northeastward of Sour islet. At 1,200 and 1,400 yards, respectively, 352° from Sour islet, are the two Chimmo rocks, which show at low water. Shoulder peak, which is remarkable, bearing 311°, leads into the bay northeastward of the reefs and rocks.

The coast from Chimmo point trends southwestward 9 miles to Huitau point, and is low, with sand hills rising about 300 feet; there are several small bays, none of which afford shelter. On the coast, which should not be closely approached, are two walled towns, and there is a small pagoda near the southern.

A reef, which breaks, projects 600 to 800 yards eastward from a point at 3¾ miles northeastward of Huitau point.

Huitau point, the eastern entrance point of Huitau bay, has an obelisk of a light color and about 10 feet high on it, which does not show well against the sky nor against the land; it has the appearance of a chimney. Northwestward of the bay are two remarkable mountains—West peak, 1,714 feet, and East peak, 1,390 feet, above the sea—which are good marks.

At 124° 1¼ miles from the obelisk on Huitau point is a sunken rock with 2¾ fathoms water on it, but on which there may be less water. Reefs, which break heavily in bad weather, project southward 800 yards and westward ½ mile from the point.

Water may be obtained about 1 mile northward of Haitau point.

Huitau bay, between Quemoy island and the mainland northeastward of it, affords good shelter in the northeast monsoon.

Oyster islet, 328° 2 miles from Huitau point, is a low, flat rock. Oyster rock, 181° 1,800 yards from the islet, is awash at low water springs.

Thalia bank occupies a central position in Huitau bay, and its eastern end bears 269° about 1¾ miles from Huitau point; thence with other rocks and reefs it extends northwestward to the mainland. The eastern end of the bank has 1¾ fathoms on it; the northeastern part of the bank is steep-to, the lead giving no warning. White rocks are situated on the bank at about 3 miles from its eastern end.

Flak island lies 297° about 6 miles from Huitau point.

Tides.—It is high water, full and change, in Huitau bay at 0h. 15m.; springs rise 16 feet.

Directions.—During the northeast monsoon there is good anchorage on the eastern side of this bay southwestward of Oyster islet in 3½ fathoms, or westward of it in 5 fathoms, but a sufficient berth must be given to a rocky ledge with 6 feet water on it, the southern end of which is 289° 1,200 yards from the islet.

With a southerly wind run up the bay northward of Thalia bank and White rocks, and anchor in 5½ fathoms with Flak island bearing about 241°, distant ¾ mile. The following track may be taken: Enter the bay with Oyster islet bearing 359°; when Huitau point beacon bears 89°, steer 316°; when Oyster islet bears 89°, steer 303° to the anchorage. The tidal streams must be considered.

The channel between Thalia bank and Quemoy is foul with several reefs, and should not be attempted without local knowledge. To clear the southern end of Thalia bank, keep the chimney on the northern end of Quemoy bearing 289° until the western White rock bears 359°, then steer 316° until the rock is 44°, when steer to pass northward of Eliza island.

The channel northward of Quemoy has 8 feet in it at low water and might be used at high tide; it should not be attempted without a pilot.

Caution.—In the northeast monsoon off this coast, and outside the limit of the tidal streams, there is usually a southerly or southwesterly set, and in the southwest monsoon frequently, though not invariably, a set in the contrary direction. Caution is required not to mistake Huitau bay for the entrance of Amoy harbor.

Dodd island lies about 6 miles southwestward of Huitau point and 2 miles off Dodd head, is about 70 feet high, with a white lighthouse on it; its outline is uneven, gradually sloping eastward, and a reef awash at high water extends ¼ mile northeastward from it.

At 78° 1¼ miles from the island is a 14-foot patch on which the sea breaks occasionally; at 299° ½ mile from the island is a reef which dries 7 feet, having at 400 yards westward of it a detached rock with 8 feet over it; and 1,800 yards northward of the island is the northern end of a reef, which extends southward 600 yards with a width of nearly 800 yards, having a depth of 7 feet on its shallowest part.

Light.—A circular white tower, 79 feet high, on the summit of Dodd island, exhibits at 147 feet above high water an intermittent white light, thus: Light 26 seconds; eclipse 4 seconds; visible 18 miles.

The light shows white seaward between the bearings 230° and 61° over an arc of 191°; red between 61° and 73°; white inshore between 73° and 210°; and red from 210° to 230°. The sectors of red light give warning of approach of the land.

The keepers' dwellings and outhouses are painted white.

Fog signal.—In answer to a vessel's fog signal two guns are fired with an interval of ½ minute between them; and if the vessel's fog signal continues to be heard the firing is repeated after an interval of 15 minutes.

Position.—Lat. 24° 25′ 44″ N., Long. 118° 30′ 11″ E.

Caution.—On several occasions Dodd island has been mistaken for Chapel island, to the southward; therefore note that the light-house on Chapel island is black, and that on Dodd island is white; Chapel island is 8 miles off the mainland, and Dodd island 2 miles.

Dodd passage, between Dodd head and Dodd island, is nearly 2 miles wide, with irregular soundings of 4¼ to 8 fathoms. Steam vessels proceeding northeastward through this passage must not bring Liaulu head westward of 279° until the extreme of Dodd head bears 6°, then steer for Dodd head on that bearing until Matthews islet bears 224°; the islet on this bearing astern leads through Dodd passage in 6 to 8 fathoms water; this passage requires caution and should not be taken by sailing vessels except with a leading wind.

Tidal streams.—During April the flood stream in Dodd passage sets northeastward and the ebb southwestward.

Dodd head, about 2 miles west-northwestward of Dodd island, is the eastern end of Quemoy island; it is rocky, and rises to a peak nearly ½ mile inland; numerous islets, rocks, and reefs front the vicinity of the head; the eastern reef, which lies ½ mile off the northern part of the head, dries 8 feet at low water.

Matthews islet, 1¾ miles eastward of Liaulu head and ¼ mile offshore, is 40 feet high; a reef, which dries 3 feet, extends 700 yards south-southwestward of the islet.

Quemoy island is about 10 miles in length east and west, and 1¾ miles to 7½ miles in width; it occupies with Huitau bay the eastern portion of the great bight between Chinha to the southward and Huitau points, and is separated from Amoy island by a channel 5 to 7 miles wide, in the middle of which is Little Quemoy island.

Liaulu head, the southern point of the eastern part of Quemoy island, bears 63° 18 miles from Chinha point.

Liaulu head, which is at the eastern point of Liaulu bay, is a peaked islet 57 feet high, connected to Quemoy island by a reef. Liaulu hill, 779 feet high, is 3¼ miles northward of the head.

Liaulu bay is on the southern side of Quemoy island between Liaulu head and a point 256° 6 miles from it; a shoal, with less than 3 fathoms over it, extends 1 mile off the eastern shore of the bay.

The southwestern part of the bay is very foul and uneven ground. There are two conspicuous rocks, 49 and 16 feet high, with others round them, lying 600 to 800 yards offshore to the eastward of the south point, and shoal patches extend outside these for nearly 1½ miles.

This bay affords shelter with northwesterly, through north, to easterly winds, and there is good anchorage in 4¾ fathoms, mud and sand, Liaulu head bearing 93° and Liaulu hill 14°; small vessels anchor in 3¾ fathoms, mud and sand, farther northward.

Tides and tidal streams.—It is high water, full and change, in Liaulu bay at 0h. 0m.; springs rise 17 feet; southward of Liaulu head the flood tidal stream sets westward and the ebb eastward.

Quemoy bank, the southern part of which is named Quemoy spit, extends 3 miles southward from the western point of Quemoy island, with a width of from 400 to 1,200 yards inside the 3-fathom line. It dries in patches, in one place as much as 9 feet, at low water. Its western edge is steep, and, though with a swell it will break, in smooth water at or near high tide it is not always quite easy to make out.

The wreck of a steamer lies inside its western edge at 1,400 yards from the southern end.

Buoy.—An automatic whistle buoy, painted red, with "Quemoy spit" in white letters, is moored in 10 fathoms, with Quemoy pagoda bearing 15°, distant 3⅙ miles.

Vessels should not pass to the northward of this buoy.

Spit bank, on which the least water found was 3¾ fathoms on its northern end, lies to the southeastward of the end of Quemoy spit.

It is about ¾ mile in length and its southern edge is situated $3\frac{9}{10}$ miles south from Quemoy pagoda.

Little Quemoy island is 3½ miles long northeast and southwest, and from 1 to 2 miles broad. Shoal water with less than 3 fathoms extends for 1¾ miles from the southern side of the island, and the 5-fathom line is 1 mile outside that limit. The highest part of the island is toward its northeastern end, where it is 328 feet high; the southwestern side is formed of lower sand hills.

Phaktia islet is of small extent and is 46 feet high. It is situated 1¾ cables to the southeastward of the south point of the island, and is not easy to make out against the land.

Port Quemoy, between Quemoy and Little Quemoy islands, has an extent north and south of 3½ miles, with a breadth of about 1 mile. A channel ½ mile wide between Quemoy spit and bank on the east and the shoals southward of Little Quemoy island on the west, with depths of 7 to 20 fathoms, leads in. Middle ground, a small patch on which there is a depth of 19 feet, lies 1¼ miles northward of the western point of Quemoy island. Flats with bowlders which dry at low water extend off the western coast of Quemoy for ½ mile and shoal water and rocks 800 yards off the eastern coast of Little Quemoy. The depths in the port are irregular. The port affords shelter from all winds.

A pier 550 yards long runs out from the western side of Quemoy; its head dries at low water springs.

Vessels other than of light draft should not proceed farther than to bring the summit of Little Quemoy 297°, as above this there are several patches of shoal water.

The tides set strongly through here, and, though it is sheltered from the northward, a swell anywhere from the southward will set in and make the anchorage unpleasant.

Directions.—From westward of the whistle buoy bring a conspicuous summit to the southwestward of West peak between the east extreme of Little Quemoy and the small islet off it bearing 6°, and steer in with that until the Quemoy pagoda bears 102°, or the summit of Stevens islet, which lies midway between Little Quemoy and Taitan, is to the northward of Phaktia island, bearing 256°. Then steer 50° until past Fort point, to the northwestward of which shoal and rocky ground extends for about 400 yards. Anchorage may be taken as convenient.

Channels.—Midway between Little Quemoy and Taitan islands is Stevens islet, about 116 feet high; on either side of the islet is a channel leading between Little Quemoy and Amoy islands, but the space between these islands has much shoal water and some rocks and islets in it.

Amoy approaches—Navigable depths.—Vessels of any draft can proceed to Amoy at all times.

Chinha point is the southern entrance point of Amoy harbor.

Banterer reef, ¾ mile northeastward of Chinha point, is a rocky patch about ⅓ mile in extent on which are several rocks drying from 1 to 6 feet. It is separated from the shore reef by a narrow channel, which should not be attempted.

The summit of Hwangkwa in line with the east extreme of Wu seu island 353° leads ½ mile eastward of the shoal.

Dome rock.—North of Chinha point and Banterer reef there is a shallow bay about 2 miles wide, and on the northern side of this, off a cliffy point, at a distance of ⅔ mile, is Dome rock, which dries 10 feet at low water.

A reef, which dries from 1 to 6 feet, extends nearly 1,400 yards from the shore near the center of this bay.

Channel shoals, on which the least water found was 3¾ fathoms, are of sand and shells and lie nearly on the direct course from outside Chapel island to Taitan light. The southern shoals inside the 5-fathom line are 1,400 yards in extent east-northeast and west-southwest, and from their eastern extreme Chinha point bears 275°, distant 4½ miles. The northern shoals are small in extent, with a least depth of 4¾ fathoms on the westernmost one, which lies 1⅒ miles 287° from the eastern extreme of the southern ones.

Tidal streams.—The tidal streams in the vicinity of Channel shoals attain a velocity of about 1½ knots.

Westacott shoals are small in extent. The least water found, 4¾ fathoms, was on the two western shoals, from the westernmost of which Quemoy pagoda bears 17°, distant 6 miles.

Wu Seu island is 1¼ miles long and from 300 to 1,000 yards broad. It is high at both ends, with a low neck of sand in between. The highest point, which is on the southern part, is 222 feet above high water. There are sandy beaches all along its western side, on the largest one of which there is a fair-sized fishing village; on the eastern side is a bay with a sand beach formed by the neck of sand mentioned above.

Between Wu Seu and the mainland is a distance of from 1 to 1¼ miles, and in this part are many islands, rocks, and reefs. Of the former, the largest is Wuan, which is 800 yards long and 192 feet high.

There are two channels through here, one on either side of Wuan, of which probably that to the westward is the better, but they are not recommended, and the tidal streams which run through and across them would render navigation difficult to any but a very handy vessel.

Chauchat rocks are three rocks fairly close together, the highest one, which is 9 feet above high water, being east by north, distant ⅔ mile from the eastern point of Wu Seu. The channel between these rocks and the island is deep and free from danger.

Chin Tseao rocks are situated on a shallow bank about 1,200 yards in extent lying between Wu Seu and Tsing Seu islands, and of which the southern end is only 400 yards distant from the northern end of Wu Seu. The rocks consist of a small islet 62 feet high, on which are a few shrubs and several heads to the westward of it that dry at low water.

Tsing Seu island lies 1 mile northwest by north from Chin Tseao islet. It is a flat-topped island, but rises slightly at either end. It is 168 feet in height and forms the southwestern entrance point of Amoy harbor.

The island is steep-to on its southeastern side, but shoal water extends off its northwestern side for about 400 yards.

There are several shoals of small extent to the southwestward of the island about 800 and 1,400 yards distant, one of the former being almost awash, and the latter (1¾ fathoms) being the end of a long tail of shoal water which extends from Taipan point in a southeasterly direction.

Light.—An octagonal tower, 33 feet high, and painted red and white in vertical stripes, on the northern slope of Tsing Seu, exhibits at 130 feet above high water a fixed light, showing red between 1° and 303°, white over the entrance and up the harbor between 303° and 130°, and red from 130° to 91°; the white light should be seen from a distance of 15 miles and the red 8 miles.

The keeper's dwellings and the wall are white.

Fog gun.—In answer to a vessel's fog signal one gun is fired, and if the vessel's fog signal continues to be heard the firing is repeated after an interval of 4 minutes.

Chin Seu, Tao Sao, and Hwangkwa are three small islets standing on a rocky reef which forms the northeastern side of the main entrance to Amoy harbor. They are 55, 65, and 111 feet high, respectively, Hwangkwa being the largest and easternmost of the three.

Shoal water extends for 200 yards to the southwestward of Chin Seu and for 800 yards to the northwestward of Tao Sao, the middle islet, near the end of which is a rock that dries 12 feet at low water. A shoal with 1¾ fathoms over it lies 400 yards to the southeastward of Chin Seu.

Seao Tan island lies to the eastward of Hwangkwa, with a clear channel between, which is 600 yards wide. The island is 1,100 yards long, 400 yards wide, and is 145 feet high. On it are the remains of ancient forts. Off its western end are detached rocks, and off its eastern end is a small islet nearly connected with it at low water.

Tai Tan island lies to the northeastward of Seao Tan, and with it is on the end of a shoal spit extending to the southward from Pechiah thau point; deep water, however, lies between them, but it is not extensive and could not be recommended as an anchorage. The island is 1,700 yards long, northwest and southeast; the southern part is high and bold, and the northern part, formed by a low sandy peninsula, rises to 3 low hills at its northern end.

The highest part of the island is 280 feet above high water, and near by are the light-house, the keepers' dwellings, and a flagstaff. The light-house is an inconspicuous white hut, through the flat roof of which the lantern is raised when lighted. Near the northern end of the island is a mandarin's house, now used as a club, and a temple.

Light.—A group intermittent white light every 20 seconds, thus: Light 14 seconds, eclipse 2 seconds; light 2 seconds, eclipse 2 seconds, and visible 10 miles, is exhibited from a white iron hub 10 feet high and 300 feet above high water, and located near the center of Tai Tan island.

Amoy Outer harbor extends northwestward about 7 miles from its entrance between Tsing Seu and Chin Seu, with an average width of about 1¾ miles, and depths of 7 to 16 fathoms. The holding ground is good, and a vessel with proper anchoring gear should be able to ride out a gale. It is easy of access, and a pilot is scarcely necessary either for entering or leaving.

Amoy outer harbor may be considered to include also the channel westward and southward of Kulangseu from Cornwallis stone round to Hauseu.

There is good anchorage between Whale island (Kiu sung seu) and Kulangseu, and off the western side of Kulangseu; also off the Amoy island shore just outside the limits of the Inner harbor. The chart will be a sufficient guide for these.

During the northerly monsoon there is generally a swell on the Kulangseu beaches, and at that time of the year the most convenient anchorage will be under Whale island, with a fair landing on Kulangseu at the disused custom-house at Modeste point (Chiu a boi) inside First rock (Chiong kun ta), where there is a small jetty.

Foul ground extends for 100 yards northward and southward of First rock.

Amoy island, the proper name of which is Hiamun, is about 23 miles in circumference and occupies the western part of the great bight between Chinha and Huitau points, in the eastern part of which lie the Quemoy islands and Huitau bay.

The city of Amoy, situated in the southwest of the island, was the scene of trade with western nations at an early date. The Portuguese went there in 1544. In 1730 trade was prohibited with foreigners at all ports except Canton, but an exception was made in favor of the Spanish, who were permitted to trade also with Amoy. It was captured by the British forces on the 26th of August, 1841, and thrown open to foreign trade by the treaty of Nanking which followed.

The southern point of Amoy is sandy, with rocks extending 400 to 600 yards off it; generally there is shoal water northeastward of a line from the western end of Tai Tan island to Cornwallis stone, 2½ miles farther westward. To clear these shoals do not bring the eastern end of Seao Tan southward of 124°.

Taipan shoal extends from Taipan point in a southeasterly direction to abreast Tsing Seu island, and has general depths of from 2 to 3 fathoms, with shoal patches of only a few feet at low water.

Between the end of this shoal and the mainland there is deeper water as far as abreast Tsao po islets, beyond which it is all shallow and foul ground.

Tsao po islets are 2 in number and lie toward the southern side of the bay between Taipan and Pagoda points. The summit of the largest and western one is 100 feet high.

Kang be kang is a creek or inlet westward of the Tsao po islets. It is 3 miles in length and dries, except for a small channel in the center for about ⅓ of its length, at low water. At its head is a fertile and well-watered valley, and a small town stands near the shore, having a prominent Roman Catholic church in its center. Considerable quantities of produce appear to be sent from here to Amoy and the neighboring towns.

Kulang seu island, the international settlement, is southwestward of Amoy island, the channel between being 400 to 700 yards wide, 1½ miles in length, and forming Amoy Inner harbor. Kulang seu is 1 mile in length and breadth, and there are 2 distinct ridges on it; the higher is 302 feet above the sea, and from the entrance of the Outer harbor it appears as one huge bowlder. The island is principally granite, and fresh water from wells is plentiful. The British consular residence on the southeastern part of the island is very conspicuous; and at about 300 yards northward of it is the eastern peak, 174 feet high, separated from the summit by a valley.

Druid head, the western point of the island, has detached rocks at 100 yards off it. Modeste point, nearly 1,200 yards northward of Druid head, has a likin station, a joss house, and a flagstaff on it; First rock, 200 yards westward of the point, covers when there is an extraordinary high tide; landing can be effected on the small pier at Modeste point. On the summit of the northern point of the island at about 600 yards eastward of Modeste point is a conspicuous stone, named Wellington's nose.

Numerous rocks, all covered at high tide, lie off the northern, eastern, and western sides of the island; foul ground extends 1,200 yards southeastward of Kulang seu, and detached rocks lie off all its points.

Kulang seu is hilly and picturesque, enormous dark bowlders occupying the summits, and numerous European houses surrounded by trees being scattered about the slopes. The highest summit is 287 feet above high water. The eastern peak, on which is the signal station, is 176 feet in height.

Those in charge of boats should consult the chart before closing the island and entering the Inner harbor.

The outer limit of the dangerous ground for boats (when the tide is low) off the south point and from thence to the east point, is well marked by 3 rocks which are several feet above high water, and at that stage of the tide boats bound for the Inner harbor should give all those rocks a berth of 200 yards and steer from outside the eastern one, which is 6 feet above high water, for the Oil stores, until Thumb rock is seen clear of Amoy island, when they can safely turn up for the harbor.

When the water is low heavy boats approaching the Inner harbor from the northern anchorage must go round the Kellett spit buoy, but at half tide there is a good passage, marked by a perch on the northern edge of the rocks extending from Ieboi, which shortens the distance considerably, and for pulling boats during the season of northerly winds is a great saving of time and labor. By keeping First rock in line with the extreme of Sung seu peninsula 242° (the extreme of Kiseu showing just outside it) a good channel through the rocks will be found, and large boats should continue on this line after opening the harbor until near to Alibi beacon.

Signal station.—The signal station is on the eastern peak, and the signal staff is in Lat. 24° 26′ 46″ N., and Long. 118° 4′ 4″ E.

Kiu sung seu, or Whale island, 1,400 yards northwestward of Modeste point, is 199 feet high and nearly connected to Sung seu by low-water rocks. Hau seu, or Monkey islet, 1,600 yards northward of Modeste point and the northern boundary of the harbor, is 61 feet high. Chalk islets, four in number, extend north-northeast and south-southwest 1,600 yards; the southern islet is 56 feet high and 329°, nearly 1 mile from Hau seu; the lower parts of these islets are white; the northern islet is 125 feet high.

Cornwallis stone, at the eastern entrance point of the Inner harbor, is a triangular-shaped rock on the beach, about 30 feet along its base and about 10 feet high, whitewashed, and marked "Lower limits;" there are depths 3 fathoms and less for ¼ mile from the stone.

Imperieuse rock, with a depth of 15 feet over it at lowest water, is situated with the Cornwallis stone bearing 68°, distant 800 yards.

Stevens rock, discovered in 1902 while sweeping for Imperieuse rock, has a least depth of 19 feet over it at lowest water, and lies with Cornwallis stone bearing 66°, distant 700 yards. Foul ground, 40 yards in extent, on which are several shoal heads of 5¼ to 5½ fathoms, exists around this rock.

A black conical buoy with a black spherical cage topmark is moored in 6½ fathoms about 50 yards eastward of the rock. Vessels should pass eastward of the buoy.

Telegraph cables.—A submarine cable is laid southward from Beveridge point, on the southern side of Kulang seu; two beacons, the upper black and the lower white, on the western side of the telegraph house, in line indicate its direction.

A French telegraph cable connects Amoy with Hué in Annam; it avoids Hongkong and touches at Kwang chau wan.

Amoy Inner harbor, between Kulang seu and Amoy, and the channel leading to it, are narrow, with sunken rocks off both shores.

The bottom in the harbor is very uneven and if cables foul the rocks they are only recovered, if at all, with much difficulty.

Considerable changes are reported (1903) in the depths about the southern part of Kulang seu and on the eastern side of the entrance to the inner harbor.

Thumb rock, 33 feet high, is about 103° 400 yards from Kulang seu signal staff, and near the eastern end of a rocky ledge.

The dangers for vessels in the Inner harbor are well buoyed, but vessels should not attempt to enter before they are boarded by the harbor master or a pilot, as they must be berthed, the harbor being full of moorings and frequently crowded with shipping.

Coker rock, situated in the middle of the entrance to the Inner harbor, has two shoal heads standing upon a considerable area of foul shoal ground. One of these heads is just awash at lowest water and lies 700 yards 140°, from Thumb rock; the other head, with a depth of 3 feet over it, lies 25 yards southeastward of it.

The rock is marked by two buoys; one painted in black and white checkers, being moored in a depth of 7 fathoms, 100 yards to the eastward of the rock; the other painted in red and white checkers, in 4½ fathoms, some distance to the westward of the rock where it also serves to cover Chang Hock Kiang rock.

Vessels must not pass between these buoys.

Chang Hock Kiang rock, situated rather more than 100 yards to the northwestward of Coker rock, has a depth of 14 feet over it.

Kaiser rock, 120° 533 yards from Thumb rock, has two heads close together and a least depth of 14 feet on it at low-water springs. A conical black buoy is moored in 7 fathoms on the eastern side of the rock. Vessels taking the eastern or Blonde channel should pass eastward of this buoy, which is named Middle rock buoy in the list of the Imperial Maritime Customs (probably to avoid confusion with the Kaiser rock in Sam sa inlet).

Brown rock, about 80° 300 yards from Thumb rock, consists of 3 pinnacles, the southwestern having a depth of 7 feet over it, the northeastern a depth of 14 feet, and the northwestern of 13 feet at lowest water, and is marked by a black and white checkered buoy surmounted by a black spherical cage on its eastern side and a red and white checkered buoy surmounted by a black spherical cage on its western side. Vessels must not pass between these buoys.

Chio Tah reef, on the eastern side of Kulang seu at 331° 900 yards from Thumb rock, dries at low water, and is marked by a black granite obelisk, 17 feet high, surmounted by a white spherical cage; a rock with 14 feet water over it lies 40 yards northward of this beacon.

Iltis rock, about 100 yards southeastward of the Chio Tah beacon, is a rocky patch with 4 feet over it.

Therese rock, with a depth of 5 feet over it, lies on the eastern side of the harbor, at 403 yards 74° from Chio Tah beacon.

Kangsim tah reef, on the eastern side of Kulang seu, and 327° 300 yards from Chio Tah beacon, dries at low water, and is marked near its eastern end by a black granite obelisk, 15 feet high.

Chapman rock, with 19 feet least water over it, formed of mushroom-shaped rocks, is situated about 300 yards 304° from High Water rock.

Alibi rock, 350 yards northeastward of the northern point of Kulang seu, dries at low water, and is marked by a black granite beacon, 22 feet high.

Devonhurst rock, 157° 300 yards from Alibi rock beacon, is about 40 feet by 20 feet, and has a depth of 13 feet over it; a rocky patch with 22 feet over it lies 30 yards farther northward.

Harbor rock, 350 yards northeastward of Alibi rock, has only 9 feet over it at low tides, and is marked by a red and black checkered nun buoy on its northwestern edge.

There are depths of 6 and 7 fathoms between the shoal and Amoy island, but this channel should not be used nor should vessels pass to the westward of the buoy at a less distance than 100 yards.

Banner rock, 300 yards northwestward of the entrance of Amoy dock, has a depth of only 6 feet over it at low water.

A rock with 6 feet over it lies 100 yards northwestward of Banner rock.

Kellett spit is the northern part of the foul ground extending ½ mile northward from the northern end of Kulang seu. A red and black vertically striped conical buoy is moored in 22 feet on its northern end. Vessels should not pass between this buoy and Kulang seu island.

Isère rocks lie southward of the spit.

When rounding Kellett spit caution is necessary, as the streams are erratic at about the times of high and low water, and the ebb sets from the Chalk islands directly on to the buoy.

Perches with round basket tops are placed thus: Three on the northern edges of reefs northward of Kulang seu, six on rocks on the western side of the Inner harbor; these nine perches are black; four on rocks on the eastern side of the Inner harbor; these are red. The baskets on all the perches are white.

Minerva rock, near the southeastern end of Cass spit or about 1,000 yards from Sung seu, is rugged and uneven, about 150 yards by 60 yards in extent with a depth of 60 feet on it at low-water springs.

A black nun buoy, with Minerva in white letters on it, is moored southeastward of the rock.

Vessels should not pass between this buoy and Sung seu peninsula.

Anchorages.—The usual anchorage at the entrance to the Inner harbor is in about 6 fathoms, mud, with Cornwallis stone bearing 90° and Thumb rock 326°; Impérieuse rock and the 20 feet pinnacle rock must be be given a sufficient berth. This is almost as near the town as a vessel can approach without having to moor.

There is also anchorage southward of Kulang seu and westward the telegraph cable.

There is good and safe anchorage in 7 to 12 fathoms in the channel westward of Kulang seu, and it is now customary for large vessels of war to moor at from 700 to 1,600 yards southwestward of Hauseu. Vessels at single anchor here are liable to drag. The bottom is soft mud with patches of gravel. The tidal streams reach a rate of 4½ knots at springs, the ebb being stronger than the flood; and the streams turn at about high and low water on the shore.

In the Inner harbor, the best anchorage is between Dock islet, off the northern part of the city, and Hauseu islet. Moorings are laid down in the northern part of the harbor for coasting steam vessels and on its eastern side for Chinese gunboats.

Pilots.—There are 2 harbor pilots at Amoy.

Directions.—From the northeastward, give Dodd island a berth of about 2 miles to clear the 14-foot patch, on which the sea breaks occasionally, lying 79° 1¼ miles from the island. Pass Liaulu head at not less than 1 mile distant, nor in a depth less than 6 fathoms, and give a good berth to the 4½ fathoms bank southeastward of Quemoy spit buoy. Nantai Wushan, bearing 268°, leads southward of Quemoy spit. Kiseu island can only be seen from abreast Quemoy spit during very favorable weather. After passing the spit steer between Tsing seu and Chin seu into the Outer harbor.

After passing between Tsing seu and Chin seu ascertain the direction of the tidal stream, as it is very strong here, and sailing vessels are often compelled to anchor.

As a rule the ebb stream for the first 3 hours sets strongest through the narrow channel eastward of Kulang seu and southeastward through the Outer harbor, and during the last of the tide through the broad channel southward of Kulang seu, and more easterly and obliquely across Outer harbor.

From the southward, when steering for Chapel island, give South Merope shoal a wide berth. Pass Chapel island at a moderate distance on either side; but a vessel of heavy draft should pass eastward of it, then bring Tai Tan island to bear 342°; keep the island on this bearing, and when Taipan point is well open northward of Tsing seu the Chauchat rocks and the 8-foot patch off them are cleared; thence steer between Tsing seu and Chin seu into Amoy Outer harbor. Nantai Wushan pagoda is a good landmark, when not obscured by clouds, as it often is during the southwest monsoon, for the entrance to Amoy.

Amoy Inner harbor should not be entered or cleared without a pilot, and it is always advisable to enter the eastern, or Blonde, channel on the ebb. Leave the buoy marking the 20-foot pinnacle rock to the westward, then keep along the coast of Amoy island; leave Coker, Kaiser, and Brown rocks to the westward. South Chalk islet just open northward of Hauseu island, 325°, leads in deep water eastward of all the rocks on the eastern side of Kulang seu after passing Brown rock, and also of Alibi rock, and between Isère rocks and Harbor rock.

The wider channel westward of Kulang seu is navigable without difficulty; keep Druid head eastward of North to avoid Anson spit, which extends about 600 yards off Anson bluff. White tower, on the low wooded point westward of Chalk islets, open of the northeastern point of Sung seu, 350°, leads eastward of Minerva rock and Cass spit; this mark, however, is difficult to distinguish from the sails of the numerous fishing boats. Druid head may be approached to within 200 yards.

Kiu sung seu is fringed with low-water rocks and may be approached to about 200 yards. When standing toward Isère rocks tack when the point northward of Druid head is midway between First rock and Modeste point. When northward of Kellett spit buoy steer for the anchorage off the city, keeping South Chalk islet open northward of Hauseu to clear the Isère rocks.

Vessels should not pass between Kellett spit buoy and Kulang seu; many vessels have passed over Isère rocks, owing to the great rise of tide, but some in doing so have been greatly injured, and one became a total wreck.

Great caution is needed when rounding Kellett spit on the ebb; many accidents have occurred there; a steamer was lost while shifting berth; the flood stream was running in on the eastern side of the harbor, but the ebb stream was running out on the western and set the vessel on the rocks.

When there is much shipping in the inner harbor, often the easiest way out is northward and westward of Kulang seu.

The channel around Amoy island is narrow and tortuous. Sung seu bay, on the northern side of which is the city of that name, runs back 7 miles westward from Kulang seu; it is, however, shoal, and only navigable by small craft.

Tides.—It is high water, full and change, in Amoy Inner harbor at 0h. 0m.; springs rise 18½ feet, neaps 14½ feet. When the sun has south declination the day tides are higher than the night tides, and when north declination the night tides are the higher; this is an exception to the general law as to diurnal inequality.

For a few days in March and again in September the day and night tides are of equal height.

The tidal rise is greater from August till December than during the other months of the year; from December the rise decreases until April, when it is least; it then increases until August.

In the Inner harbor the duration of the flood tide is about 7¼ hours, and of the ebb 5¼ hours. The rate of the ebb stream during the first 3 hours is 4 to 5 knots at springs, and during its latter part 2 to 3 knots; the average rate of the flood stream is 2 to 3 knots at springs. The flood stream runs from ¾ hour before low water to ¼ hour after high water.

The difference in heights of successive high waters is not great, but with low waters the differences are considerable, so that the diurnal inequality at Amoy consists principally in the differences of height of successive low waters, and not of high waters.

Tidal streams.—In the Inner harbor and round Kulang seu the tidal stream runs to the northward while the water is rising and to the southward while it is falling, with a velocity of about 2½ knots at springs and of 1 knot at neaps. The stream runs up the river toward Kiseu when the water is rising and down the river when it is falling, but the ebb appears to continue longer than the flood.

The velocity of the stream off Taipan point appears to be much greater than in other parts of the harbor.

Typhoons pass up Formosa strait and along the coast once or twice a year; Amoy is then visited by strong northeasterly gales with hot winds veering eastward and southward, and the port becomes a harbor of refuge.

Storm signals are made at the custom's signal station at Kulang-seu.

Amoy city.—The Chinese city of Amoy occupies the southwestern part of Amoy island, near the mouth of the Lung kiang, which leads westward to Chang chiu.

Amoy ranks as a city of the third class; its sanitary condition is very bad. The circuit of the city and suburbs is about 8 miles, and the population is variously estimated at from 200,000 to 300,000. The Chinese resident officials are the admiral or titu, the colonel or tsan chiang, the intendant of circuit or taotai, and the maritime sub-prefect or hai fang ting.

The foreign concessions are situated to the westward of the city along the shore on the eastern side of the Inner harbor. The whole island of Kulangseu has lately become an international settlement managing its own affairs under an annually elected municipal council, whose regulations and by-laws are subject to approval by the Chinese Government and the foreign ministers at Peking. The residences of nearly all the Europeans are on Kulangseu, but the mercantile establishments are all on the Amoy side of the harbor, where most of the business is transacted.

The Tongwen institute, a white building of European design, situated on the Amoy side of the harbor, is very conspicuous.

Wharves.—There is a wharf fitted with masting sheers with a depth of 18 feet alongside at high water.

Dock.—Amoy dock, situated on Amoy island and nearily abreast Dock islet, belonging to the New Amoy Dock Company, is 360 feet long, over all, 340 feet on blocks, 60 feet wide at entrance, and has 18½ feet water on the blocks at high-water springs, from August to December, but in April not more than 16 feet. The dock can take a vessel 340 feet in length.

Repairs.—There is every facility for repairing, sparring, cleaning, and painting vessels; necessary stores are kept in stock or can be rapidly procured.

Supplies.—Provisions of all kinds are good and fairly plentiful, depending largely on the number of vessels in port.

Water for boilers or washing purposes is plentiful, and is supplied at 20 cents per ton inside the harbor and 50 cents per ton outside the harbor by the Amoy Water Supply Company.

Coal.—About 5,000 tons of Welsh and 8,000 tons of Japanese coal are usually in stock. Lighters can only load when the tide is above mean level.

Time signal.—The time-signal gun is now fired on Wednesdays and Saturdays at noon, mean time of the one hundred and twentieth meridian.

The signal is unreliable and should not be used for rating chronometers.

International Code flag T is hoisted at the signal flagstaff on the southeastern part of Kulang seu about 5 minutes before the signal, and hauled down at the instant of the signal. If there is any error in the signal, the flag is kept at half-mast for 10 minutes.

Hospital.—There is no seaman's hospital at Amoy, but, in urgent cases, limited accommodation can be provided for noninfectious cases in the Hope Hospital on Kulang seu. There are also two rooms available, and a third for infectious cases, in the Chinese hospital in Amoy, but beds would have to be provided. The charge is $5 a day, not including the cost of medicines.

Trade.—Amoy is one of the principal emigration ports to all parts of the world where Chinese are employed as laborers. There has always been a comparatively good general trade. In 1904 the value of the imports by sea amounted to $10,399,905, and of the exports to $4,958,330.

Communication.—There is frequent communication with Hongkong, Formosa, and the southern coast ports; also regular but less frequent communication with the northern coast ports.

Under the Inland water regulations, steam launches carry passengers from Amoy to Chiohbé, about 10 miles distant, and the farthest navigable point on the way to Chang chiu. Another run is from Amoy to Anhai, about 40 miles up the coast, and this is the quickest route to the ancient city of Chinchu, which is distant about 20 miles overland from Anhai.

There is communication by the Imperial Chinese Telegraphs and by the Eastern Extension and Great Northern Telegraph companies with all ports and the chief provincial towns.

CHAPTER VIII.

FORMOSA (TAIWAN) ISLAND.

WEST COAST.

Formosa (Taiwan) island lies about 90 miles from the coast of China, between the parallels of Lat. 21° 55′ and 25° 15′ N., and the meridians of Long. 120° and 122° E. The island is oval in shape; its greatest length from north to south is 213 miles, and its greatest breadth 76 miles; attached to it are the Pescadores and a number of adjacent islands.

The name Formosa was given by the Portuguese at the latter part of the sixteenth century, and the island has almost exclusively been known to Europeans by this name until the middle of the last century, when its Chinese name, Taiwan, and that by which it has been called by the Japanese since it was ceded to them in 1895, came into use.

Physical features.—Formosa forms a link in the volcanic chain which, commencing at New Guinea and running northward to the Kuril islands, constitutes the eastern escarpment of the former Malayo-Chinese continent, and it is connected to the Chinese mainland by a plateau over which the depth of water is generally less than 50 fathoms, while immediately eastward of the island deep water is reached.

The backbone of the island is a range of densely wooded mountains, extending north and south, and having several high peaks; of these, mount Sylvia, or Setu san, in Lat. 24° 28′ N., Long. 121° 16′ E., reaches the height of 11,300 feet, and mount Morrison, or Niitaka yama, in Lat. 23° 29′ N., Long. 120° 58′ E., the height of about 12,850 feet.

Eastward of the range the country is mountainous, and the cliffs on the east coast are the highest in the world, presenting in some places an almost sheer descent of not less than 3,300 feet.

Westward of the range the country falls in a succession of terraces to the plain, of which the western side of the island consists. This is a broad alluvial plain, stretching from north to south, with water channels dividing it here and there, and terminating on the coast in sand banks and muddy spits. The most striking feature of this side of the island is the rapidity with which the land is gaining on the sea, an example of which is found in the fact that the British consulate at Anpei (Amping) now stands where, within the memory of present residents, junks used to anchor.

Formosa has no large rivers navigable at all seasons. The best known river is the Tamsui (Chinese Tam-shui-ki, or Sweet water brook), which is formed by the junction of the Sintiam and the Tokoham, and is navigable to the confluence by small craft. Owing to the precipitous character of the east coast few streams of any size find their way to the sea in that direction; the west coast, on the contrary, has many streams. The largest river is said to run southward of Kia i fu and enter the sea at To sek ko. Though broad, this stream is not easily navigable, owing to its shallowness and sand banks.

A great deal of the interior of Formosa remains still unexplored, but so far as is known there are no lakes in the island.

History.—The Portuguese were the pioneers of Europe in the East, and they are believed to have visited Formosa earlier than 1550, but they do not appear to have made any permanent settlement there. The island was then inhabited by a collection of non-Mongolian tribes. The Dutch effected a settlement in the Pescadores in 1622, and removed to Formosa in 1624. But in 1662, Koslinga, the great opponent of the Manchu dynasty, captured fort Zelandia and drove the Dutch out of the island. Several of his family reigned over Formosa till 1683, when the Manchus took possession of the island and made it a district of the province of Fuhkien, which it remained until ceded to the Japanese in 1895.

Products.—The commercial products of the island are various and capable of almost unlimited extension. Rice is abundant and of very fine quality; tea is extensively cultivated in the north and a large amount is exported to America; sugar is largely grown; and camphor (now a government monopoly) and camphor oil are extracted from the camphor tree. The castor oil plant grows wild. Coal is spread all over the island, the principal mines being at the Ke lung coal field, which extends southward to Suao bay; petroleum exists in many places; sulphur is found in large quantities near Tamsui and elsewhere; salt is manufactured in the south of the island, 15,000 tons a year being produced. Gold washing goes on in the north, and gold has been found near Liang kiau and between Takau and Tainan; silver and lead are also present.

Groundnuts are produced in great quantities both in Formosa and the Pescadores.

There are also numerous other products not requiring detailed mention.

Fauna.—Our zoological knowledge of Formosa is limited; 31 species of mammals are known, and 150 of birds. The largest wild beast is a black bear; there are also the fox, flying dog and bats, squirrels, and rodents. A species of ape, boars, stags, and antelopes are common, and the armadillo is to be found. Snakes of many descriptions abound, mostly harmless, though the cobra de capello has been seen. Insects are innumerable, flying beetles, centipedes, mosquitos, mantis, and grasshoppers, and at Tainan during the winter there are myriads of flies and fleas. Fish are numerous, both on the coast and in the rivers.

Climate.—The coldest month is February, when the lowest temperature at Taipei and Tainan is 38° F., the mean temperature being 61°. The warmest month is July, when it rises at Taipei and Tainan to 97°, the mean being 81°, but the highest temperature varies between May and September.

The barometer is high, 30.1 inches, in December and January, and low, 29.7 inches, in June; in winter it is higher in the north than in the south, and in summer it is higher in the east than in the west.

From September to April northeasterly winds prevail, the direction being somewhat affected by topographical conditions; thus the wind is east at Taipei, north at Tainan, and northeast at the Pescadores. From May to September the direction and strength of the wind are rather irregular, although southerly winds prevail.

The monthly average of humidity is over 80 per cent, and it varies between 93 and 73; on the driest days it is only 31 per cent. In winter it is greater in the north than in the south, and in summer the converse.

The period and quantity of rainfall are very remarkable. The northeast monsoon, warmed by the Kuro siwo, absorbs abundance of vapor, and then meeting the colder mountains in northeast Formosa condenses into heavy rain. At Ke lung, in 1898, the amount of rainfall was 206 inches; at Tamsui, 20 miles distant on the other side of the mountains, the amount is less than half that at Ke lung. On the eastern side of the mountains thick layers of clouds rise to their summits, but quickly dissolve when descending to the warmer atmosphere on their western side. In the southwest monsoon, the southern part of the island receives more rain than the northern. Tropical thunderstorms often occur, and the rainfall is therefore very considerable. The western side of the island receives by far its greatest rainfall during summer, the greatest monthly fall being in August.

Earthquakes are of frequent occurrence, and it is considered ominous when a long period elapses without a shock being felt; as a rule not much damage is done. There is a record of a severe shock in 1782, which is said to have effected a considerable change in the coast; a severe shock also occurred in 1862, and violent shocks in 1881, 1882, and 1892.

Population.—The first census of the island was taken in 1897, when the population was 2,584,365, exclusive of the aborigines, who have been estimated at 200,000, but concerning whom reliable data is absolutely wanting.

The people may be roughly divided into four elements: Independent savages; Pepohuans (partially civilized savages) and crossbreeds; Hakka immigrants from the mainland; pure Chinese immigrants.

Generally speaking, the mountains are inhabited by the aborigines and the plains by the Chinese.

Trade.—The total produce of Formosa is valued at over 40,000,000 yen annually. In 1896 the exports were valued at 11,791,051 yen, and consisted of tea, sugar, camphor, camphor oil, rice, and coals.

Northwest coast.—From Puki Kaku (Tapien point) to the northern entrance point to Tamsui river, a distance of 10 miles, the coast trends south-southwestward and is steep-to. The country is very flat for 3 to 4 miles inland and then it rises gradually to the Tamsui range. The Tamsui or Taitun range attains a height of 3,650 feet; the mountains are generally covered with clouds. The ebb or northeast-going stream often causes a heavy tide race off Syauki.

From Tamsui harbor to Pakusa point, a distance of 22 miles, it curves west-southwestward, 14 miles being low, with sand hills, and reefs projecting about ½ mile offshore, with soundings of 7 fathoms well clear of them, and there are numerous creeks, some of which junks enter. The 5 fathoms contour line being about 1½ miles offshore, within 2 miles of Tamsui shoal water extends 1 mile off the land.

Tidal streams.—On the northwestern coast of Formosa the ebb stream sets strongly northeastward, whilst the flood, even during strong breezes, is scarcely perceptible. On the ebb, tide races, with a very dangerous and confused sea, exist off all the points of this coast.

Puki Kaku, the extreme northern point of Formosa, is very low, and a shoal extends about 1 mile from it. Give the point a wide berth, as it shoals suddenly.

Light.—An iron octagonal light-house, 100 feet high and painted black and white in horizontal bands, on Puki Kaku, exhibits at 161 feet above high water a fixed white light, which should be seen seaward between 69° and 272° over an arc of 203° from a distance of 19 miles.

Fog signal.—A fog siren, worked by compressed air, gives, in thick or foggy weather, one blast of 5 seconds' duration every minute.

Shoal.—A sounding of 11 fathoms, rocky bottom, was obtained from H. B. M. S. *Vestal* in January, 1904, in a position situated approximately 294°, distant 10 miles, from Puki Kaku, the north extreme of Formosa. At the same time breakers were observed at a distance of 1½ or 2 miles to the southwestward.

Thick weather prevailed at the time, so that no bearings were obtained. The position must therefore be considered doubtful.

It must also be considered doubtful whether what was seen was a breaker over a danger or merely an overfall caused by a tide rip over part of the foul ground.

Tamsui harbor (Tansui kō).—Tamsui river, the lower reach of which is commonly called Tamsui harbor, has a barred entrance, where the shores are low, with sand hills, bordered on the south by sand and mud flats and on the north by a stony flat, on which at about 600 yards within its western end is a black beacon, 29 feet high, known as the Chinese beacon. This beacon is a masonry cone, but it is only partially completed and therefore not conspicuous.

Within the bar the river runs between the Lohan hills, about 1,700 feet high, to the south, and the Taitun soan range, on the north, of which the nearest peak, 2,975 feet high, is surrounded by an extinct crater.

A white fort, in ruins, is on the northern side of the entrance; the old Dutch Red fort, which is now the British consulate, is ½ mile higher up, on the hill, on the same side, and above is Huwei town (Japanese Kobi), which is usually referred to as Tamsui. The custom-house is directly below the Red fort. The natives generally are peaceful and orderly.

Navigable depths.—The bar is about 1,600 yards across, but the fairway channel over it is direct, 200 to 400 yards in width, with a depth of about 6 feet at low-water springs. The river within the bar is ¾ mile broad, but the southern side is filled with mud banks. The deep-water channel is about 200 yards wide between the banks off the low entrance points, and preserves the same breath along the northern shore for 1½ miles, with a general depth of 9 to 12 feet.

The bar is subject to an annual winter shoaling, when sand, thrown on the northern bank by the prevailing northeast winds, spreads over the channel and decreases the depth from 1 to 3 feet as compared with that in summer. It is probable that a typhoon would materially alter the bar.

The depth on the bar is shown by signal, and at high water averages 15 feet 6 inches at springs and 14 feet 6 inches at neaps during summer, and 14 feet at springs and 12 feet at neaps in winter.

Bar.—The bar at the mouth of the river is said to be shoaling, and only vessels of very shallow draft can go in and out with safety.

Pilots.—Native unlicensed pilots look out for vessels; they understand and speak English and are trustworthy.

Lights.—On the northern side of the entrance a square white hut on the top of an iron structure, 45 feet high, exhibits at 33 feet above high water a fixed light, showing red between 60° and 85°, white from 85° to 95°, and green from 95° to 120°; the white light should be seen from a distance of 6 miles in clear weather.

On a hill at 93° 1,400 yards from the preceding light a white pillar, 35 feet high, exhibits at 142 feet above high water a fixed white light, which should be seen seaward between 68° and 127° from a distance of 10 miles in clear weather. The above lights in line lead through the best channel over the bar when the latter is in its normal state. The high and low lights and Red fort (center) are in the same line.

A small light, maintained by fishermen, is shown occasionally from the Chinese beacon near the western end of the flat on the northern side of the entrance, but it must not be relied on.

Buoys.—The approach to the bar is marked by a conical black buoy on the northern side and a conical red buoy on the southern side, and a red nun buoy surmounted by a black cage is moored on the northern edge of the sand spit on the southern side of the harbor entrance.

No dependence can be placed on these buoys being in position; they are sometimes washed away, when they may not be replaced for a long period.

Signals made by the International Code are answered at the custom-house flagstaff.

Tidal signals indicating the depth of water over Tamsui bar are shown from a yard on the custom-house flagstaff, thus:

Depth on bar.	Signal.
Feet.	
10	1 ball at north yardarm.
11	1 ball at north yardarm and 1 ball at south yardarm.
12	2 balls placed vertically at north yardarm.
13	2 balls placed vertically at north yardarm and 1 ball at south yardarm.
14	2 balls placed vertically at south yardarm.
15	2 balls at north yardarm and 2 balls at south yardarm, placed vertically.

The balls are white. Half feet are shown by a ball halfway out the north yardarm. A ball at the masthead indicates rising tide.

Storm signals are exhibited from a staff painted in red and white bands at Tamsui, thus:

By day, a red ball indicates that a storm is approaching; a red cone that the storm is of exceptional severity.

At night, a red light is shown in place of the ball, and 2 red lights, close together, in place of the cone.

Tides and tidal streams.—It is high water, Tamsui bar, full and change, at 11h. 23m.; springs rise 11 feet, neaps 8 feet. At the customs jetty high water is about 1¼ hours later.

At about 3 miles off the coast, in the vicinity of Tamsui harbor, the ebb-tidal stream sets northeastward at 2½ to 3 knots at hour. This stream runs round the northern end of Formosa, and causes a turbulent ripple off Syauki and Puki kaku. The flood stream runs southwestward at 2 knots an hour. Both flood and ebb streams set eastward and westward directly over the bar and fairly through the river channel. The flood off the harbor has been observed to set 1½ knots at its strength and 3½ knots the whole tide, and the ebb 3 knots at its strength and 7 knots the whole tide; the duration of the flood was about 4 hours, and that of the ebb 8 hours. The ebb greatly assists a vessel beating to windward during the northeast monsoon.

Directions.—It is sometimes difficult to pick up the port when only the low land is seen, as the ship's position is affected by currents and tidal streams.

The best outer anchorage with fairly good holding ground is in about 7 fathoms, mud, with the Chinese beacon bearing about 77°, distant 1,600 yards, but it is quite open except from the land side, and vessels there must be ready for sea. If a strong northerly wind should set in a sailing ship should put to sea, as in the event of dragging there would be considerable difficulty in weathering the shoal ground southwestward of the bar, especially if the flood or south-going stream was running. In the northeast monsoon the wind blows steadily from northeast, rarely shifting to westward of north. During the southwest monsoon there is good anchorage westward of the southern bar buoy in 5 fathoms.

It was reported in 1902 that the shoal water of the bar off the river mouth has extended about 3½ cables westward.

As the channel across the bar is liable to shift from the effects of freshets or gales, no attempt should be made to enter the harbor without a pilot, one of whom can always be obtained off the bar.

The deepest water over the bar is reported to have shifted northward; caution is therefore required.

On entering the river pass northward of the red buoy marking the end of the sandspit on the southern side of the harbor entrance and about 100 yards southward of the low light-house, then run up along the northern shore at the same distance. The anchorage is very narrow, with only mooring room for 3 vessels of over 12 feet draft; one of these berths is taken up by a buoy belonging to the agents of the local steam vessels. There are several berths for vessels of 10 to 11 feet draft. For ships of war a good position is in the deep hole off Piatau point, where there is just room for 2 vessels of moderate length to lie moored.

Caution.—It is necessary to moor in the harbor, and a spare anchor should be ready to let go, as the freshets are so strong after continuous rain that vessels have drifted out and were wrecked on the bar. The best plan, if drifting in such circumstances, would be to beach the vessel, preferably on the northern side of the river, as during freshets the bed of the river shifts bodily, affording absolutely no holding ground.

In August, 1897, the rate attained by the stream during a freshet was $9\frac{8}{10}$ knots, and the river rose 16 feet in 20 hours.

Howei town, usually referred to as Tamsui, though Tamsui is, strictly speaking, the name of the port and not of the town, is immediately within the bar on the northern side of the river, and is a poor place with one narrow street. It is connected with Daitotei by rail, and trains run to and from this town in 50 minutes.

Daitotei, with a population of 20,000 to 30,000, is 9 miles up the river, and is the headquarters of the tea trade in the north. It is here that the palace of the governor-general is situated and the foreign merchants have their residential and business quarters.

Banka, with 40.000 inhabitants, and 1 mile farther up, is at the limit of navigation for large junks and a busy place.

Taihoku, the capital of Formosa, is behind and within 5 minutes' walk of these towns; it consists chiefly of the residences of officials, and bears evidence of the work of the Japanese in improved sanitation, new municipal buildings, post-office, observatory, public schools, and in various other ways. There is a railway between Taihoku and Kelung; the railway constructing from Taipei through the western part of the island to Takau is open for traffic to 20 miles southward of Hsinchu.

Productions.—The level tracts which extend to the foot of the mountains are well cultivated, affording crops of rice, maize, indigo, tea, etc.

Trade.—Kelung and Tamsui are treated as one port.

Supplies.—Provisions of all kinds are obtainable in Tamsui, also bullocks, pigs, goats, fish, poultry, and occasionally sheep, but vegetables and fruit only in small quantities. Water is brought off in sampans at $1 per ton.

Telegraph cable.—The submarine cable from Tamsui to Fuchau is landed northeastward of the harbor entrance.

Climate.—The rainy season at Tamsui lasts from the latter part of November to the end of May, when the humidity of the air makes it feel unpleasantly cold. The heat in summer is intense, although it is generally mitigated by the southwest monsoon by day and by southeasterly winds at night.

Namkam creek—Shoal, about 8 miles west-southwestward of Tamsui river. A shoal, about ¾ mile in extent, with a depth of 1½ fathoms over it, exists to the northeastward of Namkam creek in, approximately, Lat. 25° 08′ N., Long. 121° 15′ 15″ E.

Pakusa point (Hakusako), a sand hill, stands at the extremity of Pakusa point. Shoal water extends 1½ or 2 miles northward of the point, and sometimes breaks at 1¼ miles off shore.

Light.—A white circular brick light-house, 74 feet high, on Pakusa point, exhibits at 122 feet above high water a flashing light every 10 seconds, showing white and red alternately, which should be seen from a distance of 18 miles.

Coast.—From Pakusa point to Table hill, a distance of about 10 miles, tends south-southwesterly.

Table hill is 286 feet high, and conspicuous on the low coast which fronts the plain extending to the hills southward of Tamsui.

From off this hill the elevated land about Tamsui shows over the lowland as three hills, and in clear weather the high ranges about mount Sylvia are visible southeastward. Along this coast are numerous creeks. Reefs extend a short distance off, and the bottom is dark sand and bad holding ground. Southward of Table hill reefs extend nearly ½ mile offshore, and there is a barred river, the Houng mo, which junks enter.

Kiuko is a small port on the northern side of the entrance of a river which flows into the sea northward of Table hill.

Heong san bay, about 8 miles to the southward of Table hill, is formed by the land suddenly turning to the westward forming a bight. The northern part of Heong san bay is available for vessels of light draft and affords room for several large junks. The harbor is formed by a sand spit which extends 1½ miles southward from the northern point of the bay. The spit incloses a shallow basin, into the head of which flows a small stream communicating with Teukcham, a large walled town 5 miles northeastward.

Three-quarters of a mile eastward of the end of the spit is a large reef extending northward from a projecting point of the shore and between them the depth is 9 feet in mid-channel, and 13 feet nearer the spit. The head of the bay has not been sounded. At about 9 miles southwestward from the northern point of the bay is a projecting sandy point, on which is a large fishing village, rising to a low serrated sandy ridge. This point, off which the water is deep well in, is the southern termination of Heong san bay.

At the southeastern corner of the bay is Chunkan kei (Choung kong), a barred creek inside which there are sometimes numerous junks, and eastward of the southern part of the bay at about 1 mile inland is a town of the same name. There is a sunken reef northward of this creek, and also a reef extending from the center of the bay, 3 miles farther northeastward.

A rock with a depth of 3½ fathoms over it is reported to exist in Heong san bay. Its exact position is not known, but it is believed to be approximately in Lat. 24° 46′ N., Long. 120° 53′ E.

Auran (Oulan) river.—Three miles southward of the southern termination of Heong san bay is the entrance to the Auran (Oulan) river, which is apparently barred with sand banks skirted by reefs, and a rock with 2¾ fathoms over it lies 322° about 1½ miles from its northern entrance point. Auran, a small port, is within the river.

Coast.—From the Auran river to the Tuian kan the general trend of the coast is south-southwestward for a distance of about 15 miles.

Tuian kan is a small stream, the entrance of which, with a village of the same name on its southern side, is 8 miles northward of Gosai. The entrance is marked by beacons. A shoal extends 1$\frac{2}{10}$ miles westward from the southern side of Tuian kan entrance.

Taika is 3 miles from the sea on the banks of the Tuian kan, and it is surrounded by a wall.

Taika stands between 2 very conspicuous detached hills; the southern hill, Stone peak, is 602 feet high; the northern, a remarkable square-topped hill, is 763 feet high.

Ton shou.—Maulungsui, a considerable stream, flows into the sea at 8 miles northeastward of Tuian kan; on it, at 1 mile above its entrance, is the large village Ton shou. Junks enter this stream at high water.

One mile northeastward of the entrance and about ½ mile inland is Single peak, a remarkable, round, isolated hill, 303 feet high, overlooking a valley with several villages in it through which the Maulung sui winds. On the northern side of the entrance is a large bamboo plantation.

Coast.—From Tuian kan to Kochiye (Gosai), a distance of 8 miles, the coast trends south-southwestward, and the 5-fathom line extends 2½ miles off the shore at Kochiye; between Kochiye and Hoanna (Kwangwa), a distance of about 23 miles, the coast line continues in the same direction, and the soundings off this low coast being shallow and irregular, keep in greater depths than 10 fathoms; the tidal streams must be considered.

Kochiye (Gosai) is situated at the northern end of the great alluvial plain which extends southward to Tainan, a distance of 80 miles.

Mountains.—In navigating on this low coast, at a proper distance outside the banks, land is seldom visible except at sunrise, when the outline of the central range of Formosa may be seen from a great distance, the highest peak of which, mount Morrison (Niitaka yama), is 12,940 feet above the sea. The general height of the mountain range is 9,000 to 12,000 feet, and at its northern extreme is mount Sylvia, or Setu san, a remarkable hat-shaped peak 11,400 feet high. The whole range is covered with dense forests, and where the lower hills approach the coast about Kochiye (Gosai) and to the northward the plains are so abundantly watered with streams that little difficulty is experienced in producing rich crops of rice, maize, sweet potatoes, etc.

Rokan (Lokiang), a large, straggling town, is about 10 miles northeastward of Hoanna (Kwangwa), and it is especially the center of trade in Taichu plain, large quantities of produce from that fertile country being warehoused here. The coast between Kwangwa and Lokiang is low, and the mud and sand flats uncover at low water to a distance of about 5 miles from the land. At 8 miles eastward of Lokiang is a peak 715 feet high, and between them is a sand hill.

At 4 miles westward of Rokan (Lokiang) is a small outlet, marked by 2 bamboo beacons; in this a number of junks find anchorage and shelter, but most of them ground at low water; communication is made with Lokiang by boats.

The plains in the vicinity of Lokiang are thickly inhabited, and rice, etc., is exported by numerous junks which trade between the Fuhkien province of China and this coast.

The coast from Hoanna (Kwangwa) to the hut on the sandy patch at the southern part of the Wankan banks northward is low and has no distinguishing feature, the bushes and huts being only a few feet above the sea.

At low water the mud and sand flats uncover for miles, outside of which again is shallow water. This should not be approached except with great caution; the streams are very strong and must be considered.

Flats extend 1 to 3 miles from high-water mark on the coast between Kwangwa and Wankan banks, on which junks ground, and become high and dry at low water.

At Kwangwa there is an inlet in the flats at low water, where junks lie with apparent safety; but as in the northeast monsoon there is a considerable sea on this coast, it can not then be safe.

Wankan banks (Onkan tai).—The outer edge of these sand banks extends from about 7½ miles westward of the coast, where the trees appear as a bluff, 14 miles north-northeastward, or to about 2 miles westward of a sand hill 50 feet high. The banks generally dry at low water.

The small sandy patch on the southern part of the banks, in Lat. 23° 31′ N., Long. 120° 03′ 30″ E., and on which is a hut, is only 2 feet above high water. At 206° 3 miles from the hut is a patch with only 4 feet on it at low water.

There are several shoal patches within a distance of about 3¼ miles seaward of Wankan banks.

Wankan shoals (Onkan sendan) are sand banks, with 2¼ to 3 fathoms water over them, the southern end of which is situated 264° 2¾ miles from the hut above mentioned; the sea in the southwest monsoon breaks on these banks. The water deepens quickly seaward of the shoals.

Tides and tidal streams.—It is high water, full and change, at the Wankan banks at 10h. 0m.; springs rise 10 feet, neaps 5 feet. The streams turn at high and low water on the shore. Westward of the banks the flood runs 19° at 3½ knots an hour, the ebb in the opposite direction and not quite so strong.

Pescadores channel.—Pescadores islands lie 20 to 30 miles westward of Wankan banks. Pescadores channel between is 30 to 60 fathoms in depth and is narrowed to a breadth of 13½ miles between Wankan shoals and Six-foot reef, which lies about 258° from them, and to 15 miles between Wankan shoals and Kentei gan, which lies 282° from them.

Tidal streams.—In the center of Pescadores channel, eastward of Ponghau, the tidal streams early in 1866 set as follows: At high water at Makung the north-going stream, which had been running for 9 hours, ceased and was succeeded by 3 hours slack water, after which the north-going stream again made. Its rate was 2 to 3 knots an hour, with a maximum of 4 knots at half stream. Large eddies were formed by the stream, which covered the sea with discolored patches. The temperature of the water was 10° higher than at Makung harbor. Further observations are required to determine whether this condition of the tidal streams is permanent or variable.

Great caution is necessary in navigating the Pescadores channel in the vicinity of the Wankan banks and shoals, for there are no landmarks, and the strong tidal streams render a ship's position doubtful. Soundings must be constantly obtained and considered.

The Pescadores archipelago consists of 21 inhabited islands, besides several rocks, and extends between Lat. 23° 11′ 30″ N. and 23° 47′ N., and Long. 119° 19′ E. and 119° 43′ E. The islands are generally flat, no part being over 300 feet above the sea. The similarity of these islands renders it difficult to distinguish them in bad weather.

Ponghau (Hoko To and Fishers (Gyoo To), the two largest islands, lie near the center of the group, and between them is the extensive and excellent harbor of Ponghau.

Most of the islands have green tops, being terraced for cultivation everywhere practicable. Potatoes, maize, millet, and groundnuts are produced in considerable quantities, as well as a few other vegetables, but the soil is not good, being chiefly light sand mixed with coral débris. Owing to the violence of the northeast monsoon, there are no trees, but the islands are well supplied with fruits and vegetables from Formosa. Bullocks are numerous, and are used to till the ground. Fresh water was abundant in June and July, but in some seasons it is scarce.

Dried fish, groundnuts, and oil cakes are the articles of export, and the imports are rice, sugar, fruits, and vegetables from Formosa, tea, etc., from Amoy.

Shoal.—A sounding of 10 fathoms, sand and mud, has been obtained about 18 miles to the northward of the Pescadores islands, in, approximately, Lat. 24° N., Long. 119° 44′ E.

Kitajima (North island), a small island, the northernmost of the group, is 48 feet high, and besides the light-house has a house upon it to shelter fishermen. Reefs and shoals extend about 1 mile all around the island.

Light.—A circular iron light-house, 120 feet high and painted black and white in horizontal bands, on North island (Kitajima), exhibits, at 157 feet above high water, a flashing white light, showing a flash every 20 seconds, which should be seen between the bearings 29° and 329° over an arc of 300°, and visible 19 miles.

North rocks (Taigyo sho), $1\frac{4}{10}$ miles northward of North island and the northern edge of the shoal water, uncover at low tide. The northern side of these rocks is steep-to, and outside a short distance northward of the rocks there is no danger.

Northwest outlier is a bank, about 1½ miles in extent within depths of 10 fathoms, lying 3 miles westward of North island. Ōkō shō, a rock awash at low water and about 600 yards in extent, is situated on the bank at 271° 3 miles from North island; shoal ground, on which the sea breaks with a slight sea, extends 400 to 600 yards southeastward of the rock.

Sen shō, on which there is a depth of 3 fathoms, lies on the bank at about ½ mile westward of Ōkō shō.

Kitsubai sho (Bird island) is about 2 miles southward of North island, and a long sandy point, off which is a small sand island with a house upon it, forms its southern extreme. On the western point is a mound 59 feet high, connected with the rest of the island by a sandy isthmus.

Shoal water extends $3\frac{4}{10}$ miles northward from the northern point of Bird island.

Reefs also extend $2\frac{7}{10}$ miles northwestward of Bird island to a position 260° 1¾ miles from North island.

Shelter during northeasterly winds might be found westward of Bird island; and from southerly winds, northward of the reefs extending northward from the island.

A 13-foot patch lies 64° $1\frac{6}{10}$ miles, and a 27-foot patch 36° 1¾ miles, from the northern point of Bird island; within these patches the bottom is uneven.

Koba sho (Sand island), about 2¼ miles southwestward from Bird island, is ¾ mile long, north and south, ¼ mile broad, and 56 feet high; a hummock rises on the lowland in the center of the island, and it has a yellowish appearance; a rock lies off its southwestern end, and reefs extend 600 yards northwestward from the island. At ½ mile eastward of the southern part of this island is a flat black islet 40 feet high, about 600 yards northward of which is a cluster of stones, some of which are always above water.

Sable islet, 148° 4$\frac{4}{10}$ miles from the eastern end of Bird island, is small, with a sand patch on its southern cliff and surrounded with rocks. It is connected by reefs with Conch islands (Cho sho), southward of it; the southern Conch island is 80 feet high and has a large village on it.

At 24° 1¼ miles from Sable islet is a patch of 2½ fathoms with deep water close northeastward of it, and foul ground between it and the islet.

Ito sho, a rock with a depth of 4 fathoms on it, lies 26° 2¾ miles from Sable islet.

Organ islet, 69 feet high, is 161° 3 miles from Sable islet; nearly 1 mile northeastward of it is a reef, which extends about ¼ mile north and south.

Ragged islet, 56 feet high, is 123° 1,800 yards from Organ. A reef extends nearly ½ mile northwestward and ¼ mile southeastward of the islet. Between Ragged and Organ islets are several overfalls.

A sunken rock on which the sea breaks is reported to exist 39° 850 yards from Ragged islet.

Pakimuta rock, with a least depth of 7 fathoms over it, lies 71°, 2$\frac{2}{10}$ miles from Ragged islet. There is a 9-fathom patch at 119°, 1 mile from Pākimutā rock.

Naikimuta rock, with a least depth of 2 fathoms over it, lies 113°, 1¾ miles from Ragged islet.

Kentei gan, about 250 yards in extent, with a least depth of 1¾ fathoms over it, lies 107°, 2½ miles from Ragged islet. There are strong eddies in the vicinity of this rock.

Ponghau island (Hoko to), the largest of the Pescadores, is 7½ miles in extent, northeast and southwest; northward of it is an islet and northward again is Pehu island (Hakusa tō), which is about 3 miles long north and south. The channels separating these islands are narrow, with only 2 feet in them at low water, and further blocked by stone weirs. The western side of these islands is fronted by coral reefs.

Lichin point, the eastern extreme of Ponghau, is low and shelving, with reefs extending ¾ mile off it.

Round islet (Saha sho), 79 feet high, is 1½ miles eastward of the point, and there is shoal water between.

A rock, with 2 fathoms over it, lies 121°, 1$\frac{2}{10}$ miles from Lichin point. A reef, which dries 4 feet, with shoal water around it, lies

159°, 1,800 yards from Lichin point. Three islet, which has 3 hills or hillocks, lies 172°, $1\frac{3}{10}$ miles from Round islet.

There is a heavy tide rip from 1½ to 4½ miles eastward of Round islet.

Nan sho, a rock, 195°, 2½ miles from Round islet, has a depth of 2½ fathoms over it. Shoal water extends 1,200 yards northeastward of the rock.

Six feet reef (Rokushaku sho), 141°, $5\frac{8}{10}$ miles from Lichin point, has a depth of less than 6 feet over it. This reef is apparently about 600 yards long, northeast and southwest, and 400 yards broad; it has deep water around, but if there is any stream running its position may be marked by ripples.

On the southeastern side of Ponghau, between Hau and Lichin points, are 2 bays, with fishing villages on their shores, either of which affords anchorage in the northeast monsoon. The best shelter is in the northern bay, as it is protected by some rocks, the reefs lying off which may be seen from the masthead, the water being very clear. A rocky patch, named Rinto sho, with 2½ fathoms over it, lies 63°, $2\frac{8}{10}$ miles from Hau point. Some low rocks lie in a 10° direction between this shoal and the island.

Dome bay (Yencho wan), on the southwestern side of the island, also affords good anchorage in 6 fathoms, avoiding the telegraph cable. On the shores of the bay is a village and a fort.

Ponghau harbor (Hoko ko), between Ponghau and Fishers islands, affords good shelter during the northeast monsoon, but is only fairly protected with southerly winds. Baku ko (Makung harbor), which extends southeastward from it, is safe in all weather.

Triumphant point, the southern entrance point of Bako ko (Makung harbor), is bordered by a fringe reef, and there is an old Dutch fort on it.

Bako ko (Makung harbor) is at the southwestern part of Ponghau, and although there are coral reefs off its shores, it has sufficient room and depth for vessels of large draft. In 1901 it was made a naval port.

The harbor runs 3 miles eastward from Triumphant point; its southern shore is low, and on Dome hill, which is 155 feet above the sea, and the highest part of the land hereabouts, is a large pile of stones; the land between the hill and Triumphant point is low and in two places less than 200 yards across, and the isthmus eastward of the hill is low enough for the sea to break over at high water during an on-shore gale.

Within the harbor are 4 coral patches, awash at low-water springs, small in extent, and steep-to, but with proper light they may always been seen from the masthead.

This harbor is a useful port of refuge for vessels which are unable in bad weather to lie off the southern ports on the west coast of Formosa.

The most convenient anchorage is in 8 fathoms, between Triumphant point and Observatory island or Sokuten to, 1,400 yards to the eastward, and a little within the line joining them. The harbor is safe and quite sheltered in typhoons.

Tides and tidal streams.—It is high water, full and change, in Makung harbor at 10h. 30m.; springs rise 9½ feet, neaps 7 feet.

The tidal streams among the Pescadores are rapid, but are much affected by the prevailing wind.

Buoys.—White can buoys have been established in the undermentioned poisitions to mark certain shoals:

In the southern entrance to Ponghau harbor, in a position from which Fukibi kaku (Triumphant point) bears 129°, distant 2,500 yards.

In the entrance to Makung harbor, off the eastern side of Fukibi kaku, in a position from which the extreme of that point bears 278°, distant 250 yards.

Off the point next south of Fukibi kaku, in a position from which Fukibi kaku bears 318°, distant 850 yards.

Wreck.—A wreck lies sunk in 8 fathoms in Makung harbor entrance heading northeastward, with one mast and funnel showing above water.

Approximate position: Lat. 23° 33′ 02″ N., Long. 119° 33′ 10″ E.

Junks bay (Jūkoku wan) extends about 1¼ miles eastward from the eastern side of Ponghau harbor. Makung town stands on the northern side of the bay, close to the northeastern entrance point, on which is a citadel and a line of embrasures. Large junks waiting for a favorable wind anchor southwestward of the town in 6½ fathoms. The junks belonging to the place lie close to the town, northeastward of the citadel.

Dome island (Keiro to) lies 800 yards westward of the western point of Ponghau island; it is connected to Ponghau by shoal water, and a reef, the extreme of which dries 6 feet, extends 800 yards westward of it. Flat island (Shikaku to), 1,800 yards northeastward of Dome island and 400 yards westward of Triumphant point, is surrounded by reefs for about 300 yards and is connected by shoal water to the point southward of it.

Beacon.—A cylindrical cast-iron beacon with a cube-shaped topmark, 30 feet high, stands on a rock about 8 feet above low water, and situated ⅓ mile west of Dome island.

Fisher's island (Gyoo to), westward of Ponghau, is about 5 miles long north and south, but of irregular width: Siau point, its southeastern extreme, is a bold cliff 170 feet high. Litsitah point is its southwestern end, and shoal rocky ground extends ½ mile southward and southwestward of it, in which directions the point should not be approached within the distance of about 1 mile.

Lung islet (Run to), 2½ miles northeastward of Litsitah point, is 77 feet high and connected to Fisher's island by a bank.

A reef which breaks at low water, lies about ½ mile westward of the islet.

Light.—A circular black tower, 33 feet high, on Kitsushibi (Litsitah point), exhibits, at 205 feet above high water, a fixed white light, which should be seen from a distance of 15 miles. The light is obscured by islands in some directions.

The keepers' dwellings are painted white.

This light is frequently partially obscured by sand being blown past it from the surface of the island in the northeast monsoon, the tower not being high enough to carry the light above the sand drift; owing to this and the light being of small power, it is sometimes not seen from a distance of more than 5 miles.

Fog signal.—In answer to a vessel's fog signal, two guns are fired with an interval of 5 minutes between them; and if the vessel's fog signal continues to be heard the signal is repeated after a further interval of 10 minutes.

Tidal streams.—The tidal streams off Litsitah point set flood northward, ebb southward, and attain a rate of 5 knots. The tide ripples are very marked.

Triangle island (Shomon sho) lies close off the northern point of Fisher's island. It is 79 feet high and terminates northward in a bluff. There is an obelisk on its top. Foul ground extends about ¾ mile northward of the western point of the island. On this ground at 3° 1,200 yards from the western point of Triangle island is a rock with 7 feet water over it, and a detached patch of 4½ fathoms lies 800 yards northward of this rock.

The northeastern point of the island is a table bluff, with reefs which cover at high water extending 400 yards northeastward from it.

Fish point, the eastern point of Fisher's island, is separated from the western part of Pehu island by a channel 1 1/10 miles wide, which is much occupied by reefs.

Tortoise rock, 352°, 2 1/10 miles from the western point of Triangle island, is 11 feet above water and steep-to on its northern side. There is a rock which dries 4 feet ⅛ mile to southward from it.

A shoal ½ mile long northeast and southwest and about 300 yards broad, with a least depth of 1¾ fathoms on it, lies about ½ mile southward of the rock.

Anchorage.—There is shelter, with smooth water in a northeast gale, off the southern side of Fisher's island between Litsitah and Siau points, where there are the two sandy bays, Siau chi and Ta chi.

In Siau chi, or the eastern bay, is a fort or line of embrasures, and in Ta chi bay a run of fresh water, except during the dry season.

Niu kung bay (Gyuko wan), between the northern end of Fisher's island and Pehu island, affords shelter in the southwest monsoon, but the streams in the bay attain a rate of 5 knots.

The eastern coast of Fisher's island trends northward from Siau point, and forms several small bays which are steep-to at 200 yards from the beach until at Rhan point, 2½ miles northward of Siau point, reefs extend nearly 600 yards off shore; Siau point, westward of 200°, leads eastward of the reefs. Black rock, 57° 1½ miles from Siau point, is always partially uncovered; when passing eastward of this rock, keep within 800 yards of it, as coral patches extend some distance from Ponghau.

There is anchorage in about 4 fathoms northward of Rhan point with Black rock 159°, and the highest part of Tatsang island 84°; in the bay abreast are two runs of fresh water. When working up for this anchorage, to avoid the coral reefs extending from Ponghau island, do not stand farther eastward than to bring Black rock 201°. The harbor northward of this anchorage is much chocked with coral patches. There is a passage northward between Fisher's island and Pehu island, which may be used in emergency by vessels of 15 feet draft, but local knowledge is necessary.

Kosei sho (Table island), 149°, nearly 5 miles from Litsitah point, is not quite 2 miles long, east by north and west by south and 300 to 600 yards wide; it is flat and 184 feet high; its southwestern end is nearly separated from the main part of the island by low land and it appears from a short distance northward or southward as two islands. A spit extends 400 yards from its eastern end. A patch of 7 fathoms lies 128° 1 mile, and a patch of 10 fathoms at 149° 1,400 yards from the south extreme of the island.

Table island is conspicuously basaltic, the basalt, of a dark hue, being disposed side by side like slates, a bundle of them peaking out on one side near the top.

Good water has been obtained in June near the northeastern end of Table island.

Tablet island (Tampoan su) is about 1 mile northward of Table island; it is 68 feet high. A shoal with a least depth of 3 feet over it extends 1¼ miles northwestward from the island.

Rover channel (Hatto suido), between Table and Pa chau islands, is nearly 5 miles wide and apparently clear and deep.

Rover group (Hatto retto), consisting of Pa chau and Tsiang islands and several rocks, afford shelter under their lee in either monsoon. Steeple channel (Togun suido), 3¼ miles wide, separates them from Steeple island.

Pa chau (Hatto to), the western island, is 2½ miles long, north and south, and 1 mile broad, and its summit, 174 feet high, is dome-shaped, with a large pile upon it. A reef extends $1\frac{4}{10}$ miles westward from the southwestern point of the island; its end is always above water, and a reef which covers at high water lies westward of the summit and 400 yards offshore. There is foul ground for about ¼ mile northward of the island, and a rock which always shows lies 800 yards off the northeastern point.

Yoshino rock, 177°, 1¼ miles from the southeastern point of Pa chau island, has a depth of 11 feet on it. A 9-foot patch lies ¼ mile east-southeastward of the rock and foul ground extends about 800 yards farther southeastward.

Iwasaki rock, 191°, $1\frac{8}{10}$ miles from the southeastern point of Pa chau, has a depth of 15 feet over it.

The soundings between this rock and Pa chau are irregular, there being one patch of 27 feet.

Tidal streams.—Off the Rover group the north-going or flood stream makes at 4 hours after high water, and the south-going or ebb stream at 2 hours before high water. The rate of the north-going stream in the Shogun suido sometimes exceeds 4 knots during the strength of the southwest monsoon, while the south-going stream rarely reaches 3 knots, but these rates may be reversed during the northeast monsoon.

Tsiang (So to), the eastern island, is 1¼ miles long northeast and southwest and about ½ mile broad. Rover knob, the eastern point of this island, is an isolated cliff, 110 feet high, and very remarkable; 1,400 yards eastward of the cliff is a ledge of rocks, parts of which are always above water: the western end of the island is also a cliff.

At 132° 1,500 yards from Rover knob is a 2¼-fathom patch, and in the same direction, at 1¼ miles from the knob, is the eastern end of a line of rocks and shoals extending westward $1\frac{8}{10}$ miles. Shoal water extends 600 yards southeastward of the southern point of Tsiang.

On the northwestern side of Tsiang are two islets, under the southern of which a small vessel might find shelter in a northerly wind, but do not stand too far into the bay, as there are only 6 feet at 400 yards offshore.

Tide ripples.—There are strongly marked tide ripples at 2½ miles eastward of Tsiang island.

Shogun suido, the channel between Pa chau and Tsiang, is barely 200 yards wide, and intricate. In the center of the southern part of the channel is a small rock, 7 feet high, with a reef extending ½ mile southward of it, and a detached patch of 2¾ fathoms lies about 1,800 yards southward of the small rock.

Ka sho, about 5 miles west-northwestward of Pachau, is 2 miles around, 175 feet high, and uneven in appearance. A reef, awash at low water, extends 300 yards from the southeastern end of the island, and sunken rocks extend 600 yards off its southwestern part.

Daibyo sho (High island), 251°, 9¾ miles from Pa chau summit, is dome-shaped, 249 feet high, and ¾ mile around. At 1 mile eastward of it is a low flat island, and between the two are several rocks. A rock 14 feet high lies 159°, about 1,600 yards, from the low flat island, a reef extending between.

Sho retto (Reef islands), two in number, are connected by a stony ledge; reefs extend 1¼ miles southeastward of them. A rock 83 feet high lies about 400 yards northwestward of the northwestern island, and a similar rock ½ mile westward of the western end of the southern island, with foul ground between. A 2½-fathom patch lies 117°, ½ mile from the eastern end of the islands. The Japanese name of the southern island is Toshohei.

Peaked rock, 169°, 1¼ miles from the southeastern end of the southern island, is 126 feet high. Low rock, 267°, 1¼ miles from Peaked rock, is nearly awash, and Flat rock, 84°, 1¼ miles from Peaked rock, is 16 feet high. A rock with 3 feet over it lies 233° 800 yards from Flat rock, and a 4¾-fathom patch lies 151° 1,200 yards from Flat rock.

Steeple island, 1 mile northward of the northwestern point of Reef islands, is a remarkable pyramid 152 feet high.

Seikitsu sho (Peting island), 79°, 3¾ miles from Flat rock, is 1½ miles in circumference and 102 feet high, with a reef extending nearly ¾ mile northeastward of it.

Tokitsu sho (East island), 2½ miles eastward of Pe ting, is 2½ miles around and 156 feet high; a small islet with which it is connected by a reef, lies ½ mile northwestward of it. Reefs extend about ¼ mile off the island.

Daisho To (Junk island), the southern of the Pescadores, is 1¾ miles long, east and west, 1½ miles wide, and the highest part is 213 feet above the sea. It is bordered by reefs and rocks for the distance of about ½ mile. Its eastern side is fronted by bold cliffs; and its western extreme is a long shelving point.

Formosa banks, southwestward of the Pescadores, considering their limiting edges to be the depth of 20 fathoms, lie between Lat. 22° 33′ N. and Lat. 23° 09′ N.; their eastern side is in Long. 119° 15′ E.; but their western side can scarcely be delineated, as between the banks and the coast of China there is no marked increase of depth. The banks have not been surveyed, but the general depth on them is 8 to 20 fathoms, coarse white sand. On the banks in Lat. 22° 50′ N., Long. 118° 21′ E., approximately, is a depth of 4 fathoms; and 4 miles southward of this position is a depth of 7 fathoms with deeper water between; there is a depth of 5 fathoms in Lat. 23° 01′ N., Long. 118° 29′ E., and of 7½ fathoms in Lat. 23° 01′ N., Long. 118° 41′ E. Sea Star shoal, on which there is a depth of about 2½ fathoms, is in Lat. 23° 19′ N., Long. 118° 53′ E., but this position is doubtful. A depth of 8 fathoms, in Lat. 23° 07′ N., Long. 119° 12′ 30″ E. A depth of 14 fathoms, in Lat. 23° 00′ 45″ N., Long. 119° 11′ 15″ E. The shoal spots on the banks appear to have deep water close around them, and heavy overfalls generally indicate these sudden changes in depth.

Great caution should be observed in approaching the banks, as from the character of the soundings and the heavy overfalls it is probable that there is less water on them than is shown on the chart.

Fish in large shoals have been seen on the banks in April and May. The current during April and May generally sets northeastward 1 mile an hour, becoming more rapid as Formosa is approached.

The coast, for over 30 miles southward from Wankan shoals to the anchorage at Amping is fronted by sand bars which are only 2 to 4 feet above high water. These bars are in lines, generally parallel to the coast, from 400 to 1,000 yards broad, and are pierced at every mile or so by narrow channels 7 feet and less in depth. The space within the bars seems to be sand and mud banks and shallows, with occasonal patches of sedge.

These sand bars are occupied by a few fishermen, who live in miserable huts and use bamboo rafts. Ape hill and the southern island of the Pescadores are useful marks.

On kan (Ai aw creek), between Wankan banks and the low coast, runs northward 4 miles, and has a narrow channel which affords anchorage and shelter for junks and small craft. In the southwest monsoon it is impossible to enter the inlet, and in the northeast monsoon good shelter can be obtained outside.

To sek ko (Tangchu), as it is called locally, is situated in Lat. 23° 32′ N. at the mouth of the Nintiao river, and about 25 miles westward of Kia i fu. It is a small village, but it is the outlet for a considerable portion of the trade of the important town of Kia i fu and for the produce of the agricultural districts lying between that place and the coast.

The inner harbor, which is within a shoal, is approached by entrances known as north and south channels. It is available for vessels of very light draft only; those drawing over 6 feet lie in the open roadstead off it, where the anchorage is not very good.

Storm signal station.—Signals are shown from a mast, painted in red and white bands, at To sek ko thus: By day a red ball or cone; by night, a red lantern light in lieu of the ball, and 2 red lantern lights in lieu of the cone. The ball indicates that bad weather is approaching, and the cone that the storm is of exceptional severity.

Ka ko ko is a small port with a shallow river harbor, northward of To sek ko, but its exact position is not yet known. Its imports are cotton piece goods, kerosene, timber, and grass cloth; and exports rice, brown sugar, dried lungans, and oil cakes.

Poteishi (Pawtaichui) is 10 miles southeastward of Wankan banks, a narrow strip of sand 4 or 5 feet above high water, fronting the coast between. The village is 1 mile from the entrance, and the inhabitants are piratical. The entrance to this small inlet runs south-southeastward, and it is difficult of access when the monsoon is strong. Ang hai kang (the native name), a mound covered with trees and huts, and the most noticeable object between Ka kau and Wankan, lies 3½ miles south-southwestward of the village and 1¼ miles within the sand bar. West of this are sand banks and shallows which project nearly 2 miles outside the general run of the coast.

Shoals.—Shoal water, of less than 5 fathoms, extends about 4½ miles westward of the sand bars off Poteishi, and at 4 miles west-northwestward of the entrance to Poteishi is a patch of 2 fathoms, with depths of 2½ to 3 fathoms 1 mile northwestward of it.

A sand bank named Katsuragi su, on which there is a depth of 3¼ fathoms, lies in Lat. 23° 19′ N., Long. 120° 01′ E., and depths of less than 5 fathoms extend 900 yards northward and southward of this position and 500 yards eastward and westward of it.

A sand bank, with a depth of 4½ feet over it, is situated approximately in Lat. 23° 24′ N., Long. 20° 02′ 30″ E. Depths of less than 3 fathoms extend 1$\frac{3}{10}$ miles northwestward and of less than 5 fathoms for 1$\frac{4}{10}$ miles northward, 400 yards eastward, 1,200 yards southward, and 1,000 yards westward of this position.

Western sand bars extend between Gull point and Ka kau, 7 miles northward; from them there is no vegetation in sight, and the highland of the island can only be seen in very clear weather. The western extreme of these bars is named West point, and is situated about 329° 3 miles from Gull point.

Beacon.—A wooden framework beacon, about 100 feet in height above the sea, stands on a sandy knoll about 1 mile north of Gull point, and is an excellent mark.

There are some clumps of huts and trees on the sand banks within Western sand bars, which may be seen from 3 to 4 miles off them. The southernmost clump, which is abreast West point, is the largest and most conspicuous.

Kokushin kan, 4½ miles northwestward of Kokushin mon, is the outlet of several small shallow streams which unite and form a channel through the sand banks fronting the coast.

The sand bars between Kokushin kan and Kokushin mon are named the Southern sand bars.

Gull point, the northern entrance point of the port, had three groups of huts on it which were larger than those on the other sand bars off this coast.

Kokushin mon, 3¾ miles northwestward of Amping, is a passage through the sands; it has not been examined for many years. The ebb stream runs southward out of the harbor. The masts of the junks usually in the harbor may serve as a guide for its position.

Joss islet, 1¼ miles northeastward of the harbor entrance, has a large clump of trees on its southern end and the joss house on it has a white front to seaward.

Vuyloy shoal.—This sand bank lies at about 1½ miles west-southwestward of the entrance to Kokushin mon. With southerly winds the sea breaks heavily on it, but with offshore or northeasterly winds there is but little break. In 1895 it was reported that this shoal was dry land. It is also said to be farther offshore.

Amping anchorage, off an opening in the beach, which is the nearest approach to Tainan from the sea, is an open roadstead where, from December to March, during the strength of the northeast monsoon, there is sheltered anchorage with smooth water, in 5½ fathoms, with Amping light bearing between 40° and 60°. During the rest of the year the chance of southwesterly winds renders this position unsafe for sailing ships, and anchorage should be taken farther out, but in the strength of the southwest monsoon and the heavy rollers which accompany it no vessel could lie off this coast.

With a southwesterly wind the sea quickly rises and is said to break in 5 fathoms. In the typhoon months vessels should be ready to proceed to sea at short notice.

The anchorage should be approached from the northward with caution, and the lead used constantly, as sand banks extend a considerable distance from the shore.

The bar is most dangerous, and can not be passed by cargo boats for day and weeks together. It constantly shifts, and, like the harbor within, is shoaling rapidly. All about this coast, where good harbors existed formerly with 15 to 20 feet water, there is not now sufficient to float a junk. According to Dutch and other records, the sea at one time extended to the fort inside Tainan city.

There is a boat camber with a good landing place close to the light-house.

Beacons.—Three beacons stand on the coast at about 1 mile, 2 miles, and 3¼ miles southward of the opening in the beach leading to Amping, and 1 beacon at 1½ miles northward of that opening. These beacons are white, of wooden framework, each 38 feet high, and pyramidal in shape, with the upper part horizontally boarded over.

Peculiar rafts called catamarans, simply large rafts of bamboo lashed together and propelled either by the ordinary Chinese paddle or a large bamboo sail, are used for communicating between vessels and the shore, and are managed by the Chinese with great skill. The rafts have a slight railing around them, and a large tub in which the passenger sits. Trade ceases entirely from June to September (inclusive), all goods being then sent to Taku for shipment.

Amping.—The old Dutch ruined fortress, Castel Zeland, built in 1630, has succumbed to time and earthquakes. A large banyan tree still remains and there is a clump of trees 1¾ miles northwestward of it on the outer sand bar. The ruins of the fort are now about a mile from the sea, and around its position has grown up, on the continually rising mud and sand banks, Amping.

Beacon.—A conspicuous triangular wooden beacon painted white is located on the 37-foot hill in the southwestern part of the town.

At ¾ mile southward of Amping is a large conspicuous earthwork fort with a flagstaff.

Caution.—New shoals are said to be forming along the western coast of Formosa which are not marked on the charts. The land is gaining so rapidly on the sea that many places, which were deep water only a few years ago, are now shoal. A wide berth, therefore, should be given to the coast between about Amping and the Taian kiang in Lat. 24° 23′ N. when running along it. Care must be taken to guard against the strong set of the current toward the coast which occurs at times, and the current should always be allowed for.

The British consulate is now in Amping. In 1904 there were about a dozen Europeans residing in the town.

Light.—A fixed white light is exhibited from a white cylindrical brick tower 17 feet high and 77 feet above the sea, located northwestward of the tree on the mound in Fort Zelandia.

The light is visible 10 miles between 352° and 100° over an arc of 108°.

Telegraph cable.—The telegraph cable to the Pescadores is laid from a position 1 3/10 miles southward of the opening in the beach leading to Amping 240°, ½ mile, thence westward.

Between Amping and Tainan, 2 miles eastward, is a large expanse of mud flat which has a road over it with a trolley line. A canal runs up to the west gate of the city, which is used by cargo boats at high water. It is intended (1900) to deepen the present canal between Amping and Tainan to at least 6 feet, and to erect a sluice at the mouth inside which junks may anchor.

Tainan is a prefectural city of 70,000 inhabitants, surrounded by a wall 20 feet high, quadrangular, and 5 miles in length. Within it are the residences of the chief citizens. The country around is cultivated and highly fertile, producing sugar and rice. Seaward of it lies an extensive suburb containing the chief markets where the bulk of the business of the city is done. There is a railway station at Tainan.

Trade.—Rice and sugar are the principal exports; the imports are cotton goods, kerosene, tobacco, paper, and miscellaneous goods in small quantities.

Communications.—There is railway communication with Takau, and the line to Kelung and Tamsui in the north is nearly complete.

Climate.—The winter is healthy and pleasant, with a clear, bracing air. The northeast monsoon is very little felt, being intercepted by the mountain ranges, but when a northeaster blows the air is filled with sand and dust which penetrates the houses and is very disagreeable in the open. In summer the heat is oppressive, for the southwest breeze which blows upon the coast is lost before it crosses the plain, and sometimes for days the thermometer does not fall below 90°, rendering the nights unbearable; in the daytime it frequently reaches 100°. Europeans then go to Takau to enjoy the sea breeze. Heavy rains occur in summer.

The coast from Amping anchorage to Ape hill trends about south-southeasterly for 22 miles, and is a very low nearly straight beach, through which 4 small streams, navigable only for boats, flow; and from within 8 miles of Ape hill, where some low mud cliffs terminate, and where also is a small table-land about 1 mile inland, it is without any remarkable feature.

A hill, 823 feet high, 22° 11½ miles from Ape hill, and another, 1,024 feet high, 1½ miles farther northward, are remarkable, and are generally visible when the mountains in the interior are obscured. The clouds sometimes rest on them, when they appear to be the highest land in the vicinity.

Southward of Tainan, which is about 3 miles eastward of Amping anchorage, the land approaches within 1 mile of the sand bars fronting the coast, and although it is generally marshy and flat, it is cultivated with rice, etc. The sand bars are occasionally clothed with bushes and grass, and are densely populated by fishermen, whose rafts, hauled upon the beach, placed in tiers on their sides, form a feature in the appearance of the coast.

Ape hill, 1,163 feet high, appears on northerly bearings like a truncated cone, sloping toward the land side, and from a distance like an island; its barren, rugged sides rise with a steep slope from the sea, facing which is a large white land slip.

Ape hill is of coral, its summit resembling a crater, and from its summit the land descends southward in a gradual though somewhat rugged slope, terminating in a small, green looking mound separated from Ape hill by a chasm.

Whaleback hill, 4 miles northeastward of Ape hill, is 719 feet high and remarkable.

Ryder rock, awash at high water, lies about 700 yards off shore, with rocky bluff on Ape hill bearing 80°, and there is said to be a 5-fathom channel between it and the shore.

At 200 yards southwestward of Ryder rock is a rock with a depth of 13 feet over it at low-water springs.

Anchorage.—There is good anchorage and smooth water in the northeast monsoon under Ape hill, but in the southwest monsoon heavy rollers come in and it is undesirable to anchor there.

Takau ko is a small basin just within the entrance of a lagoon, 6 miles in length and 1 to 2 miles in breadth, which runs southward parallel to the sea and which is bounded northward by a rich plain, through which winds a little river.

The entrance to the harbor is between Saracen head and a mound southward of Ape hill, where the fairway channel is only 200 feet wide.

The bar consists of loose sand and is constantly shifting, both when freshets occur and in the southwest monsoon when wind and swell oppose the strong tidal stream setting out of the lagoon. In the same monsoon in bad weather the sea breaks over it, rendering it impassable for a week or ten days afterwards.

In consequence of the frequency of the changes in the position and depths over the bar, no vessel should attempt to enter without a pilot. The depths range from 12 to 7 feet.

In January, 1904, constant north-northwest winds were experienced, sending in a considerable swell and making the anchorage off the bar very uncomfortable.

Pilots.—There are Chinese licensed pilots, who are under the superintendence and regulations of the harbor master, from whom they obtain their certificate. One usually awaits the arrival of ships.

The harbor is immediately within the entrance and it only admits small vessels and junks. Steamers of any size anchor outside the bar and tranship cargo by means of lighters and a small local steamer.

All official buildings and foreign concessions are situated on the northern side of the harbor, while the business depots of the natives are opposite at the foot of Saracen head. There are no European merchants resident at Takau.

Merchant vessels can lie alongside the jetty of the custom-house godowns on the northern side of the harbor.

The population of the Chinese town on the southern side of the harbor are chiefly fishermen, and in this town are the residences of the medical man and the missionaries; there is also a small Chinese hospital.

Communication.—In April, 1905, the Trans-Formosan Railway was complete from Takau to Kelung, except for a short distance between Hakkoko and Koroton.

It is intended to improve the harbor by building a causeway across the lagoon, constructing 2 breakwaters seawards from the entrance, widening and deepening the entrance and dredging the inclosed part of the lagoon, so as to allow the entry and anchorage of vessels of the largest size visiting the port.

Supplies.—Water can be obtained from a spring on the northern shore, but not in any large quantity; the price charged is $1.50 a ton, and care must be taken that it is not procured from the wells on the southern side, which are brackish and contaminated with sewage. Fresh beef of very inferior quality is supplied, also fruit, vegetables, pigs, fowls, ducks, eggs, rice, sugar, and fish.

Coal.—No stock of coal is kept for sale.

Trade.—The trade at this port has fallen off and no activity prevails here.

Sugar and rice are the principal exports; kerosene, cotton, and woolen goods the principal imports.

Climate.—The climate of Takau is hot, but healthy; it is never cold. No special diseases prevail likely to affect Europeans.

Tides.—It is high water, full and change, at Takau, at 8h. 30m.; springs rise 3½ feet, neaps 1¾ feet. The day tides are higher than the night tides from April till September, and the reverse in the opposite season.

Directions.—At Takau entrance, Ape hill, the only high land in the vicinity, stands out prominently, and Saracen head is scarcely less conspicuous.

No attempt should be made to enter without a local pilot.

The harbor is difficult of exit in the southwest monsoon, and sailing vessels, which are sometimes detained 3 weeks, have generally to be towed out against the heavy swell.

Saracen head (Kigo to) is a rocky hill, 800 yards long north-northeast and south-southwest, and about 200 yards broad, bounded seaward by precipitous cliffs. There is sheltered anchorage for small vessels in the strength of the northeast monsoon on its southeastern side.

Light.—A light-house, a white square building, 16 feet high, with the lantern in its seaward corner, on the northern and highest part of Saracen head, exhibits, at 164 feet above high water, a fixed white light, which should be seen seaward between 323° and 159°, from a distance of 10 miles.

Signal station.—There is a signal station on the northern part of Saracen head, under the direction of the harbor master; all vessels sighted are signaled.

Position.—The light-house is in Lat. 22° 36′ 14″ N., Long. 120° 16′ 00″ E., approximately.

Coast.—The coast from about 7 miles southeastward of Takau entrance is a low narrow strip of sand, with bushes and fishermen's huts on it, which separates the large lagoon from the sea.

Hong pi tau is a rocky point and the termination of the smooth and slightly rounded Ho San hill, which is about 3½ miles northward of Tokei entrance, about the same distance inland, and 478 feet high. Between the hill and point is a well-marked saddle hill, 259 feet high, which appears as 2 chimneys on northerly or southeasterly bearings.

Tankan hakuchi, about 14 miles southeastward from Takau, is a river flowing southward from the central range of mountains, through a fertile rice and sugar plain, to Tankan (Toko gai), a port at its mouth. At low water there are only 4 feet on the bar, which shoals rapidly from 30 fathoms. The port will only admit vessels of less than 8 feet draft; larger vessels anchor in the roadstead, northward or southward of the entrance. The entrance, which is about 100 feet wide, can generally be distinguished by the junks, about 20 of which are always moored on the right bank of the river, and also by a clump of trees a little northward and about 2 miles inland.

Between the mouth of the river and Lambai island, 7 miles south-southwestward, is a remarkable depression in the sea bottom, there being a depth of nearly 200 fathoms in one place.

Tides.—It is high water, full and change, at the entrance of the river at 7h. 21m.; springs rise 4 feet, neaps 2 feet. From October to March the postmeridian tides are the higher, and from March to October they are probably the lower. The diurnal inequality of height at springs is about 2½ feet at high water and 1 foot at low water, and of time about 1h. 20m. at high water.

The tidal streams run from ¼ to ¾ knot an hour, and are irregular.

Toko gai, a town on the left bank of the river near the entrance, has about 20,000 inhabitants. A launch service 3 times a week is carried on between Toko gai and Takau.

Lambai island (Shoryūkyū tō), in Lat. 23° 20′ 30″ N., Long. 120° 22′ 30″ E., is a coral island 2½ miles long, northeast and southwest, with an average breadth of 1 mile; it is flat and reaches a height of 291 feet; the northern side is rugged, with a few small sand beaches; the southeastern has a sandy bay ½ mile in extent, near the middle, and on its western side are high yellow cliffs. The northeastern point is round, of white sand, and conspicuous. The island is fringed with coral. Chinese fishermen inhabit the island and there are some houses on it.

Coast.—The coast between Tañkan hakuchi and Boryo, 11 miles southeastward, is a low sandy beach; a short distance inland are numerous clusters of bamboos, Chinese houses, and a highly cultivated country.

Boryo (Pong li), a small Chinese town, is a short distance inland and about 1 mile northward of a remarkable square clump of trees on the beach. There is anchorage abreast the town in 5 fathoms, about 600 yards from the beach.

Pong li, situated on the verge of the great western plain of Formosa, is isolated from the southward by a chain of mountains which terminate almost perpendicularly toward the sea and whose plateaus are occupied by the Butang tribe.

Chi tong ka, 7 miles south-southeastward of Boryo, is on a point, bordered by a reef, which projects ½ mile from the foot of the high land; the coast is bold and steep-to, the hills in places descending almost vertically to the sea. There is anchorage along the coast in 8 or 9 fathoms, with shelter from winds from north, through east, to south-southeast. The bold land terminates at 2 miles northward of Chi tong ka and at the foot of a hill 1,340 feet high, whence the mountain range trends northward and the coast, which is low and level, northwestward.

Fuko (Hongkong), 4½ miles southward of Chi tong ka, is a large Chinese village of Chang chau men who have a few boats but fish little. The hills around are densely wooded. The villagers cultivate a valley among the hills.

Haikao wan (Liangkiau bay) is 6 miles southerly of Fuko (Hongkong). This bay affords anchorage in 3 fathoms at 600 yards from the shore, and is sometimes available when all the other landing places southward of Takau are rendered inaccessible by the monsoon.

A patch of 9 fathoms, with deep water around, lies about 313° 3½ miles from Lang kiu point, but the position is doubtful.

Shoals.—A reef, named Tsuikinsoa, with a least depth of 3 feet over it at low water, exists in (approximately) Lat. 22° 06′ 37″ N., Long. 120° 42′ 10″ E. From the point of least depth the reef within the 5-fathom contour extends about 200 yards eastward, 300 yards southward, 200 yards westward, and 500 yards northeastward.

A rock, named Chonsoa, with 2¾ fathoms of water over it, exists in (approximately) Lat. 22° 06′ 00″ N., Long. 120° 41′ 30″ E.

A sandy shoal, with 4¼ fathoms of water over it, exists in (approximately) Lat. 22° 06′ 15″ N., Long. 120° 41′ 30″ E.

Chashon wan (Expedition bay), to the southward of Liang kiau bay fronts a level tract of land three miles in extent, between Bay hill and Lang kiu point, 2 miles northward. Lang kiu point is the sandy projecting point of the low grassy flat stretching from the foot of the hills, off which low-water rocks extend 400 yards and a shallow sandy spit extends ¾ mile. A little within the beach is the walled village Lang kiu, and on the northern side of Bay hill, where the bushes are near the shore, is a small stream.

The bay is open to all westerly winds, but affords good anchorage in the northeast monsoon between the outer points in 9 fathoms, sand, the depth decreasing gradually toward the long sandy beach.

Lang kiu, the principal village of the district, contains about 1,000 Chinese, is walled, and has a ditch round it, with plank bridges to the two gates. A practicable military road, which connects Lang kiu and the entire south with the capital, owes its construction to the fact of the southwest monsoon closing the communications by sea in July, 1867, when an expedition was fitted out against the hostile natives of the south.

Auwana is a nook at the head of the small bay immediately southward of a point on which is Bay hill, 235 feet high, small and isolated. The reefs from either shore meet within 200 yards, leaving an entrance to a basin about 400 yards in diameter, with depths of 5 to 3 fathoms. The coast northward is inhabited by Chinese.

The coast from Expedition bay to Niaupi kaku (Southwest point) trends about 164° 7 miles. The hills are mostly bare, their summits only being wooded, and there are no villages, but merely a hut here and there along the coast.

The coast, of dark, rocky cliffs, is steep-to, with depths of 150 fathoms at 1 mile and 50 fathoms at ½ mile from it, except in the bight, where the depth is 16 fathoms at ½ mile offshore. The promontory from the northward appears as an island; its northern point terminates abruptly seaward, but slopes gradually toward the plain.

Niaupi kaku (Southwest point) is the southwestern point of Formosa. Chim kong ho, a small bay northward of it, has a remarkable sand beach, with depths of 23 fathoms at ½ mile offshore, and 52 fathoms at ¼ mile off its northern point, where there are strong tide ripples.

Nan wan (Kwa liang bay) lies between South cape and the hilly and moderately high promontory Gus wa, of which Black point, at 281° 6 miles from South cape, is the southern end. The eastern shore of the bay is under the cape range, the two highest parts of which are directly over the middle part of the bay. At the head of the bay is a sandy, white beach, which shows well under the dark land, and at its western end is a peculiar bluff. Projecting from the hillside is the Chessboard, a remarkable mass of limestone; this is a famous legendary rock of the Chinese.

Three black rocks, 10 feet high, easily distinguished and steep-to, lie within ½ mile of the shore, almost equidistant from each other, and a rock awash at high water lies 250 yards southeastward of the western rock.

Shoal.—A rock, with a depth of 5 feet over it, exists off the coast in Kwa liang bay at a distance of about 3½ miles to the northwestward of South cape light-house, in approximately Lat. 21° 56′ 15″

N.; Long. 120° 47′ 20″ E. It is steep-to and has depth of from 5 to 10 fathoms close around.

Anchorage.—In the northeast monsoon there is good anchorage in 10 to 12 fathoms, about ½ mile from the shore, anywhere in the northern and northeastern parts of the bay. In its southeastern part great caution is necessary in coming to, on account of a strong eddy, which sets southeastward at the rate of 4 miles, and the overfall off the point is very heavy.

Nan sha (South cape) (Gooram Pi) is low and formed of coral limestone. An isolated rock, with deep water around, stands up boldly close to its southeastern point; the rocky points are much perforated. The cape is fringed by coral.

At 4 miles northwestward of the cape is a peculiarly rugged hill, 1,035 feet high, from which the land slopes down gradually to the cape, the whole, with the exception of a few clearings, being densely wooded. Farther northward is a double-peaked mountain about 2,000 feet high.

Northeastward of the cape there is said to be a village and harbor for small craft.

Light.—A white circular light-house, 59 feet high, at 550 yards northward of South cape, exhibits, at 180 feet above high water, a fixed light, showing white between 94°, through north, and 234°, and red between 94° and 151°, which should be seen from a distance of 20 miles.

When bearing between 234° and 265° the visibility of the light depends on the distance from it, owing to the height of the land eastward of the light-house. With the light bearing 234° it is not visible when distant under 15 to 20 miles, but as it bears more westward the arc of visibility increases until, on the bearing 265°, it is visible at all distances to the limit of its range.

Westward and northwestward of Southwest point the light is obscured by the land between the bearings 99° and 151°.

The dwellings and wall are white.

Fog signal.—In answer to a vessel's fog signal, two guns are fired with an interval of 3 minutes between them, and if the vessel's fog signal is still heard the firing is repeated after an interval of 8 minutes.

Climate.—At South cape the air is much drier during the northeast monsoon than during the typhoon season. There is not much difference in the amount of cloud, but perhaps it may be a little more cloudy in summer, which is the rainy season.

On the east coast of Formosa it is clearest in summer, while on the west coast it is clearest in winter.

The northeast monsoon prevails upward of 8 months. In summer the mean direction of the wind is much influenced by typhoons.

Vele Rete rocks, 190°, 9 miles from Nan sha (South cape), are a group of detached rocks about 1 mile in extent, above and below water. The three highest, lying northwest and southeast from each other, are 15 to 25 feet above the sea. The depths near the rocks are from 50 to 70 fathoms, except on the southeastern side, where at ½ mile the depth is 24 fathoms.

The channel between them and the southern end of Formosa is safe, but very heavy tide ripples are often experienced, extending nearly the whole distance between them and South cape. These ripples sometimes resemble the sea breaking on a shoal.

Current.—The northerly current sets rapidly over Vele Rete rocks; it passes South cape of Formosa and Botel Tobago and Samasana islands, causing strong eddies round the points and bays of the islands, and great caution is necessary in their approach.

Formosa—Northeast coast.—The coast from Pu-ki kaku trends east-southeastward for 5 miles, and for the first 4 miles rocks appear to extend off 1 mile. It then trends southeastward and appears bold for 4 miles to the northern point of Masu bay, off which is Double rock, 30 feet high, with three rocks lying nearly 1 mile southeastward of it, two of which are covered at low water; the other always shows. Masu bay is 2 miles across at its entrance, its southern side being Masu peninsula.

Masu peninsula juts out about 1¼ miles from the coast; its northwestern side is a remarkable perpendicular hill of sandstone 311 feet high.

Immediately southeastward of Masu peninsula is a bay 3 miles across, with numerous reefs extending from the points within it; and 2 miles farther on is the entrance of Kelung harbor.

Kelung harbor (Kiirun ko) is easy of access and well sheltered in all except northerly winds, which send in a heavy sea. Kelung island is 2½ miles northeastward of the entrance.

The country in the vicinity of the harbor is richly wooded to the beach, and the land rises in a succession of picturesque knolls and undulating hills, fantastically piled one above the other, and backed by a range of lofty mountains. The coast hills are wedge shaped and nearly all are perpendicular to northwestward, sloping eastward.

Banjintai bi, or Image point, the western entrance point of the harbor, is remarkable from the peculiar shape of the detached sandstone rocks close off it. The land at 400 yards westward of the point is 336 feet high, and there are several patches of stratified cliff on its seaward side.

Light.—A white brick cylindrical tower, 30 feet high, on Banjintai bi, exhibits at 133 feet above high water a fixed light, showing white from 151° to 182°; red from 182° to 188° (over Shin se); white from

188° to 347°, and obscured in other directions, which should be seen from a distance of 15 miles.

From seaward of Keirō tō, that island obscures the light in a sector of about 4°, or from 222° to 226°, approximately; it is also obscured by Chūzan and Sharyo to islands and the land southward of them.

Kago bay, within Banjintai bi, is the headquarters of the harbor works department, and here there is a steam factory for the repair of the machinery and hulls of the dredges.

Toban sho (Bush islets) are three rocks, about 10 feet high, covered with shrubs and surrounded by coral reefs, situated about 400 yards westward of Sharyō tō. Their western end is marked by a beacon, consisting of a white grating mounted on a black spar 41 feet high.

Inflexible reef, southwestward of Sharyō tō, is a sunken ledge of rocks with depths of 1 to 3 fathoms over it, covered with coral, and nearly 400 yards in extent. On its outer edge are two knolls of 4 and 6 feet, the western of which is marked by a black conical buoy, surmounted by a cylindrical topmark, on its western edge 105°, 800 yards, from Banjintai bi light-house.

Sento bi, or Crag peak, a remarkable sugar-loaf hill, 170 feet high, is on the western shore of the harbor, 1,200 yards southward of Banjintai bi. From it projects a shelf of sandstone, on which is the mushroom-shaped Ruin rock. Coral shoal, a ledge with a depth of 3 to 9 feet on it, extends 350 yards eastward of Sento bi, and its outer edge is marked by a red conical buoy surmounted by a conical topmark.

Dredging.—Two black conical buoys, each carrying a black flag with a white ground, are temporarily moored at 45°, 300 yards, and 151°, 140 yards, from the Coral shoal buoy, to mark the work in progress.

Koko to (Harbor island), in the inner harbor, has a white spar beacon, 28 feet high, surmounted by a ball on it.

Anchorage.—The holding ground is good, but in certain conditions of weather with northerly winds, the only shelter from the heavy swell is in the inner harbor under the red buoy, where vessels of 1,700 tons now anchor and work cargo at any time. The greater portion of the southwestern part of Kelung harbor has been dredged to a depth of 26 feet, while the dredging was being actively continued in March, 1903. During the northeast monsoon, when the inner harbor is generally full of small vessels, partial shelter may be obtained southward of Inflexible reef.

Tides and tidal streams.—It is high water, full and change, in Kelung harbor at 10h. 07m.; springs rise 4 feet, neaps rise 2½ feet. The flood stream at the entrance sets fairly into the harbor about 1 knot an hour; the ebb sets toward the eastern shore and reefs off Toban sho.

In the Junk passage, between Sharyo to and the main, the streams are rapid.

Outside the harbor the stream sets strongly eastward during the ebb, and only occasionally changes its direction to the northwestward during the flood.

Between Kelung and Craig island, 26 miles northeastward, in May a current, perhaps the flood tidal stream, set southwestward 2 miles an hour on one occasion.

Directions.—In approaching the harbor caution is required in the vicinity of Shin se. Sento bi, bearing 193°, leads between Shin se and Keiro to and to the entrance of the harbor. After passing Banjintai bi, bring its extreme to bear 314° astern, and anchor when the beacon on Toban sho bears 7° in 7 to 9 fathoms, mud, good holding ground, southward of Inflexible reef.

In sailing vessels much caution is required in leaving this harbor during the northeast monsoon, in consequence of the heavy sea rolling in and there being no anchorage outside. With a light wind make short tacks, keeping the entrance open until an offing is gained.

Kiirun (Kelung town) stands at the head of the southwestern part of the harbor; it contains from 1,000 to 1,200 inhabitants. This is the terminus of the railway.

Harbor works.—It is evidently intended that Kelung is to become the principal port in Formosa; a breakwater is to be constructed partly across the entrance, and the upper part, where excellent shelter exists, is being dredged. A large extent of the mud flats off the old town has been reclaimed, and on this reclaimed land a new city is to be built.

Nine wharves, each capable of berthing the largest sized steamers alongside, are to be built out from the southern shore of the harbor.

Vessels anchoring in the upper part of the harbor must lay out a stern anchor, in order to lie parallel to and clear of the fairway.

A pier, 448 feet long and 24 feet wide, extends in a northeasterly direction from Boudinot's point; it is connected with the railway by trolley lines. Steamers can lie on both sides of the pier in a depth of 24 feet at low water, and the channel leading to it from the outer harbor has been dredged to the same depth.

Harbor limits.—The harbor limits of Kelung harbor are bounded by two lines, one drawn from Binjintai bi 61° to the northern point of Chuzan, and the other running 213° from Senzan bi.

Sharyo to (Palm island) is ¾ mile long east and west, about 800 yards wide, and 282 feet high. Close to its northwestern side, and almost connected with it, is Chuzan island, 136 feet high. Both islands are fringed with steep shelving rocks. Sharyo to is separated from the main by a very narrow channel, available only for boats and junks, and which has a rock at its narrowest part, and another at 300 yards westward of its western entrance.

Telegraph cable.—The cable from Japan enters Junk passage at its eastern end and is landed on its southern side.

Storm signals are exhibited from a white mast on the southwestern part of Sharyo to, thus: By day, a red ball indicates that a storm is approaching; a red cone that the storm is of exceptional severity. At night, a red light is shown in place of the ball, and 2 red lights close together in place of the cone.

Supplies.—Provisions are plentiful, but notice must be given; bread and vegetables are scarce; pigs, poultry, and sweet potatoes may be purchased.

Water is easily obtained on the western side of the harbor, in the second small bay within Crag peak; there are several other streams.

Coal.—Vessels are coaled from lighters of 6 to 10 tons each, the coal store being ½ mile from the anchorage. Kelung Colliery Company keeps a stock of over 1,000 tons of native coal and delivers it on board at $3 to $5 a ton, according to quality; no other description of coal can be obtained.

Kelung coal is small and bituminous, good for domestic purposes and for steam vessels making short passages, but it is otherwise unsuitable; it burns rapidly, cakes the furnace, makes much smoke, and chokes the tubes. The consumption is about one-half greater than Welsh coal, and its evaporating power one-third less; whilst it is necessary to sweep tubes frequently.

Slip way.—A slip way is available at Kelung for vessels of about 400 tons, but possibly it may be enlarged so as to be capable of accommodating vessels up to 1,000 tons. Designs for another slip way are under consideration.

Trade.—The principal articles of import into Tamsui and Kelung are opium, cotton and woolen goods, metals, machinery, kerosene, matches, flour, and sundries; the exports are camphor and camphor oil, coal, tea, hemp, sugar, rice, and sundries.

Climate.—The northeast monsoon is generally attended with rain. The summer is fine; there are occasional black northeasters with rain, which send a considerable swell into the harbor, but as they do not often blow home, it is then usually nearly calm at the head of the inlet; when they do blow home, they send in a heavy sea, and it is not uncommon for European vessels to part their cables and junks to be wrecked. Typhoons are rare.

Kelung island (Keiro to), 106°, about 5 miles from Masu peninsula, is a remarkable black rocky island, 602 feet high, with a rather flat summit.

Northwest rock, 92 feet high and conical, is 200 yards off its northwestern side.

Kitsugansekitai, a spit of gravel and rock, $1\frac{3}{10}$ miles in length and about $\frac{1}{4}$ mile in width, extends 216° from the island; there are depths of $2\frac{3}{4}$ to 3 fathoms on the spit for 1,300 yards from the island and 9 to 19 fathoms on its southern part; there is usually a heavy tide race over the whole of it. It is most imprudent to cross this spit. Image point just open of Chuzan island, 238°, leads southeastward of the spit. The other parts of the island are steep-to within 200 yards; the depth between the spit and Chuzan island is 24 to 29 fathoms, and the channel is 800 yards wide.

Shin se.—At 277°, $1\frac{7}{10}$ miles from Northwest rock, is a rock of small extent with 19 feet water over it; and 282° 300 yards from this rock, is a pinnacle rock (Audacious rock) with 18 feet water over it and 11 to 23 fathoms around.

Petu point, over the southwestern point of Kelung island, bearing 117°, leads 300 yards northeastward of these rocks.

The coast from Kelung harbor to Petu point is steep-to, the offlying rocks, which are sandstone, being above water. The most remarkable feature on this coast is Dome peak, which appears dome-shaped on southwesterly bearings.

Hatto ko (Petu, or Coal harbor), the entrance of which is about 1 mile southeastward of Senzan bi, the eastern point of Sharyo to, is a small inlet near the coal mines. It is open northward, and is surrounded with reefs and rocks; the head of the inlet is shoal. The harbor affords anchorage for 1 or 2 vessels only.

Chimmo bay, about 1 mile eastward of Hatto ko, is $1\frac{1}{4}$ miles wide at its entrance, where the depths are 10 to 4 fathoms; the depth at the head of the bay under the eastern entrance point is 4 fathoms; this point is foul.

Pittao kaku (Petu point), 5 miles eastward of the eastern entrance point of Chimmo bay, is a peninsula 400 feet high, which appears as an island from a distance. A small boat harbor and Petu fishing village are on its western side. The mountains southwestward of the point rise 2,850 feet.

Light.—A white hexagonal tower, 41 feet high, on Petu point, exhibits at 221 feet above high water a revolving white light. which attains its greatest brilliancy every 30 seconds, and should be seen from a distance of 19 miles, between 91° through south to 325°.

Samucho kaku (Samtiau point), the northeastern extreme of Formosa, is low and flat, but a little inland is a hill range which terminates in a bluff.

Pinnacle island, called by the Chinese Tsaou su, or the Chair-bearer, owing to its resemblance to coolies carrying a sedan chair. lies 32°, $16\frac{1}{2}$ miles from Keiro to, or Kelung island. It is a rugged rock, 152 feet high, with perpendicular sides, and around it are three semidetached pinnacle rocks about half the height of the island. The island is surrounded by a low reef, which extends westward, probably 400 yards.

Craig island is 72°, 7½ miles from Pinnacle island. Its eastern end is a steep cliff rising to the summit of the island, 178 feet in height, and off it are two high craggy rocks surrounded by a large reef. Its southern side is also a steep cliff, and on its western side is a sandy bay, the western point being a flat, conical head with a low cliff. The northern side of the island is a gradual but broken slope, off which there is anchorage in 9 fathoms. In June the island is visited by a species of tern similar to the wide-awakes of Ascension island in the South Atlantic.

Agincourt island, 355°, 8½ miles from Craig island, has a round summit 465 feet high, and high, bold headlands on the north and south, in the latter of which is a very large cavern. The eastern side is very steep; the western is less so, and has a high, stony beach with a small village within it; a reef extends off the southwestern point. Soundings of 20 to 45 fathoms were obtained around the island, within 1 mile, the western side being shallower.

These three islands lie in the Kuro siwo, or Japan stream, but are also within the influence of the tidal streams.

Light.—A fixed white light, visible 7 miles, is exhibited from a white triangular building, 10 feet high and 116 feet above high water, located on the western extremity of Agincourt island. The light is visible from 7° through east to 249°, and is temporary during the erection of a permanent light-house.

Formosa—East coast.—The east coast is mountainous, and, excepting Suao bay, without harbors, with deep water close-to. The mountains rise almost directly from the sea; some places are cultivated, and there are houses occasionally.

The southern part of the coast is fringed in places with recent coral.

Steep island (Kusoan to), 10 miles southward of Samucho kaku and 3 miles off the main island, is about 1½ miles in length, east and west, and 1 mile in breadth; it is inhabited by Chinese and cultivated in terraces to its summit, which is a sharp conical peak about 1,335 feet above the sea. At its eastern end there is another peak 800 feet high; a bank of sand or shingle extends westward at least a mile from the island with deep water close to it.

A small islet, 27 feet high, with a rock on its southwestern side, lies 1½ miles southwestward of Steep island.

Kaliwan river.—At about 20 miles south-southwesterly of Samucho Kaku, is the entrance to Kaliwan river, the waters of which irrigate a fertile plain about 13 miles long and 6 miles broad. There are

3 feet on the bar at low water, the tidal rise being 2 to 3 feet. The surf breaks across the entrance, but the junks, with their high bulwarks and great buoyancy, enter with comparative ease, the crews poling them across with bamboos.

The general direction of the river is southwestward. The entrance is about ¼ mile wide, but just within it narrows to 200 yards. At 4 miles up it is only 50 yards wide, and thus far it has a general depth of 5 to 6 feet, clear fresh water. At 7 miles from the entrance the depth is 3 to 4 feet, and the river is about 10 yards wide.

The country on either side of the river is everywhere under cultivation, principally with rice, Indian corn, millet, and sugar cane in small quantities. The inhabitants, who are domesticated aborigines and Chinese, of the different villages along the banks, have been found civil. The aborigines are of a clear olive complexion, and in feature resemble Malays, they are a much finer looking race than the Chinese, who have intermarried with them, but they live in harmony, both dreading the Chiukwan or savage tribes of the mountains.

Soo wan, about 6 miles southward of Kaliwan river.

Suao bay, in Lat. 24° 35′ 30″ N., Long. 121° 49′ 30″ E., is an excellent place of shelter for vessels working up this coast against the northeast monsoon. The bay is about ¾ mile wide at entrance, and 1 mile deep, and in it are 2 coves; that in the southern corner is a sheltered nook named Lam hong ho (Nanhō wan), which has shallow water, and is only available for vessels of light draft (9 feet and under), of which two or three can lie moored secure from all winds; the other on the northeastern corner, is named Pak hong ho (Hokuhō wan), and affords shelter to one or two vessels in 5 fathoms, except from south to southeast winds which prevail from June to September but are at other times rare.

Suao and the villages to the northward are inhabited by Chinese, mostly fishermen, but Lam hong ho by Pepos, a semicivilized aboriginal tribe.

The Japanese have a small military station at Suao. It is the farthest south that they have occupied on the east coast. Beyond to the southward is the aborigines' country, which they have not yet attempted to bring under control. A good military road to Taipei is being made.

Shoals.—A rock, with a depth of 4¾ fathoms over it, exists in the northern approach to Suao bay, in a position from which Tam sien tai (Hokkaku) bears 199°, distant 1,166 yards.

A cluster of rocks that dry about 2 feet is situated about 78° 300 yards from the above-mentioned rock.

Tides and tidal streams.—It is high water, full and change, at Suao bay at 6h. 35m.; springs rise 6 feet, neaps 4½ feet. The tidal streams are weak in the bay. The flood sets southward along the coast and the ebb northward with a rate of 1½ knots an hour.

San sen tai (Arlyi rocks) are a group of which the western and largest rock, 98 feet high, lies 103° 1,400 yards from Hok kaku, the western extreme of the promontory forming the northern side of Suao bay. Foul ground extends 300 yards southeastward of this rock. There are 2 rocks, about 71 feet and 37 feet high, 500 yards east-northeastward of it, and 233° 400 yards from it is a 15-feet patch.

Northwestward of Suao rocks and extending ½ mile east-northeastward and 1,400 yards northeastward from Hok kaku, is much foul ground, with rocks awash, which generally break. Between Suao rocks and this foul ground is a channel 600 yards broad, with a depth of 7 to 12 fathoms, but as the bottom is rocky and uneven it should not be used. The coast of the promontory between Pak hong ho and Hok kaku has 2 islets off it, their southern point being 250 yards offshore with deep water close to the southward.

Tong sim tai (Breaker reef) (Bo ha sho) is of coral and about 400 yards in extent, lying a little more than ½ mile from the shore and nearly in the center of the bay. Parts of it are uncovered and others awash. Some rocks on the reef are above water, the highest being 31 feet above the sea. This reef breaks the sea and swell and affords the only safe anchorage in the bay for vessels above 10 feet draft, where a ship could ride out a gale.

The passage between this reef and the rugged point, Si ho mui, to the southward, is full of rocks, with only 4 to 6 feet water over them, and although greater depths are also found, it is not safe for navigation.

Serpent rock, with 11 feet water on it, lies 300 yards northwestward of the highest rock of Tong sim tai.

Anchorage.—There is good holding ground in the outer part of Suao bay in 10 to 13 fathoms, black sand and mud, about 99° from Tong sim tai and with South point 179°. The anchorage is sheltered except from easterly winds, when it is unsafe. The best anchorage is under Tong sim tai. In rounding its northern end, to avoid Serpent rock, keep the southern ends of the easternmost Suao rock and a conspicuous rocky islet 94 feet high, off the north point, in line, 87°, until the highest rock of Tong sim tai bears 134°, when immediately haul southward and anchor in 7 fathoms, with the high rock bearing 112°, distant about 500 yards; or if of less than 12 feet draft with the rock bearing 89°. The water shoals rapidly.

South head (Nan kaku), the southern point of entrance to Suao bay, is 177 feet high. A reef extends 150 yards off it, and a detached rock awash at low water lies 300 yards southeastward of its northeastern extreme.

Ochiu point (Dome point) is about 6 miles southward of South head and is 578 feet high.

The coast from Dome point to Chock e day, 25 miles southward, is exceedingly bold and precipitous, the mountains rising 7,000 feet almost perpendicularly from the water's edge. There is no bottom, with 70 fathoms at 1 mile off shore.

Chock e day village is near the sea in Lat. 24° 06′ 30″ N., and there is a high surf on the coast. When this coast was visited in 1867 the aborigines were nearly naked, and used threatening gestures, brandishing their long knives and spears. The river marked on the chart in this latitude was not seen. At 1 mile offshore there is no bottom at 115 fathoms.

The coast southward to Black rock bay is rugged and rocky. The lower slopes of the hills are covered with grass; behind the hills mountains rise to a height of about 5,000 feet, and are covered with dense forest.

A rocky reef extends off the village situated on the coast in Lat. 23° 30′ N.

There is a small bay with a fishing village on its shores in Lat. 23° 53′ N., and a triangular beacon, painted black and white in horizontal bands, surmounted by a staff and ball, is near the village.

Black rock bay (Sansendai bay) is in Lat. 23° 07′ N. Seikowan or Chokonwo is a place of shelter in the bay available only for boats and small craft. It is quite circular, with a diameter of about 200 yards and surrounded by coral reefs, a narrow entrance leading into it.

Black rocks are 2 volcanic blocks 78 feet high, nearly touching each other, and with a little verdure on their summits. The island of which they were a part is almost joined to the mainland by a number of detached rocks and reefs. There is anchorage in 13 fathoms ¾ mile west-northwestward of the northeastern part of the rocks, but this position is by no means to be recommended, as the bottom is rocky and uneven, and a heavy swell always rolls in.

Double peak, a mountain on the coast 58 miles northward of Nan sha, is about 2,500 feet high.

Samasana island (Kasho to), 15½ miles from the coast and 119° from Double peak, is about 1¾ miles long west-northwest and east-southeast, 1 mile broad, and volcanic; its northern extreme is low, with a double hillock on it, and a pinnacle rock, with a high arch through it; a small rock lies ¼ mile northward of the extreme. An isolated rock lies ½ mile northeastward of the eastern point of the island; and from the same point a reef, on which the sea breaks, is reported to extend east-southeastward 2½ miles. The southern point falls abruptly. There is anchorage nearly ½ mile northward of the island in 13 fathoms, rock and sand; as the north-going current sets in a strong eddy round the northern side of the island, the anchorage is not recommended.

Sailing ships should not pass to leeward of the island, as calms, eddies, and variable winds are likely to cause delay.

The inhabitants are Chinese, and mostly from Fuhkien province.

The cultivated products of the island are rice, maize, cucumbers, and other vegetables and fruits, and the people barter yams, sweet potatoes, fowls, and eggs for calico stuffs. Communication with China must be very rare.

Botel tobago (Koto sho), about 63 miles southerly of Samassana island and about the same distance from the coast, is 7½ miles long, west-northwest and east-southeast, about 2 to 4 miles broad, and appears saddle shaped, or with a gap in it on northerly or southerly bearings. The highest part is covered with trees; the northeastern peak is 1,807 feet high, and the western peak is a sugar loaf 1,820 feet high.

On the northwestern side of the island are several rocky points; detached rocks, remarkable for their spire-like form, and also a rocky islet, lie off the northeastern point.

Temporary open anchorage has been obtained about ½ mile from the beach on the northern side of the island in 21 fathoms, black sand and rock. The coast is rocky almost throughout, and landing is said to be probably dangerous on account of numerous rocks; deep water has been found at 1 mile off the island.

In 1867 the island appeared to be densely inhabited, and there were several large villages on its southern part, but the natives were timid and refused any intercourse. Goats, pigs, and fowls seemed plentiful, and the cultivation of rice, maize, and Indian corn extensive. Only very small canoes were seen. The island belongs to the Japanese.

Little Botel Tobago island (Shokoto sho), 3 miles south-southeasterly of Botel Tobago, is small and 569 feet high; reefs, on which are detached rocks above water, extend 600 yards southward of the island and the same distance northwestward of its western point; there is foul ground all around it. This island belongs to the Japanese.

Forest Belle rock, with less than 6 feet water over it, lies 189° 6 miles from Little Botel Tobago island.

Gadd rock lies 180° 14 miles from Little Botel Tobago island, and in the fairway of Bashi channel, is about 100 yards across, with a least depth of 10 feet on it, and 30 to 40 fathoms close around, deepening to 69 and 127 fathoms within the distance of 1 mile.

To clear Gadd rock keep either toward Botel Tobago or toward the northern part of the Batan group. When passing southward of the rock in thick weather or at night keep well toward the latter group, making allowance for a northerly current, which is generally experienced in light winds and during the southwest monsoon.

Tide ripples.—At low water the sea probably breaks on Gadd rock, but violent tide ripples and smooth whirls exist between Gadd rock and Vele Rete rocks; a considerable berth should therefore be given to Gadd rock.

At about 11 miles southward of Gadd rock heavy overfalls and discolored water have been passed through; no soundings were obtained and bottom could not be seen from aloft; it would seem probable from this that the tide ripples and whirls may extend southward of Gadd rock.

CHAPTER IX.

AMOY TO HONGKONG.

Chin ha point.—Beginning at Chin ha point, which is the southern entrance point to Amoy harbor and which is 310 feet high, the coast trends southwestward for 3 miles to Table head, forming a small bight between these two points.

Table head (Tin hai) has three chimneys on it and the ruins of a walled town on the hill above it; the strata of the head is flat. Nantai Wushan pagoda, 1,720 feet above the sea, is on the hills at about 350° nearly 5 miles from the bay.

Caution.—Vessels passing inside the rocks and shoals off the coast southward of Amoy must use the utmost caution. It is inadvisable for ships of heavy draft to pass inside Chapel island.

Tingtai bay lies westward of the Table head, and affords fair shelter for small vessels in the northeast monsoon. A rocky patch, 500 yards long north and south and 250 yards broad, with 2 fathoms over it, lies in the southwestern part of Tingtai bay; from its shoalest part Table head bears 70° distant 2 miles.

Erl King shoal, with 4½ fathoms over it, but on which there may be less water, lies with Chapel island light-house 144° 3$\frac{1}{10}$ miles.

A considerable area between Chapel island and the coast was examined in 1902, when no other danger was found, but the depths are very irregular.

Rambler shoal, a patch with 16 feet water over it, lies with Chapel island light-house bearing 123° distant 5¼ miles.

Chapel island (Tungting), 142° 8½ miles from Chin ha point, is about 180 feet high, with steep sides and grassy top, and perforated at its southern end; there is also a remarkable mound at either end.

Light.—A round black tower, 63 feet high, on Chapel island, exhibits at 227 feet above high water a fixed and flashing white light showing a flash every ½ minute, which should be seen from a distance of 22 miles. The keeper's dwellings and wall are white.

Fog signal.—In answer to a vessel's fog signal, two guns are fired with an interval of 3 minutes between them; this signal is repeated.

if the vessel's fog signal continues to be heard, after an interval of 10 minutes.

Position.—Lat. 24° 9′ 49″ N., Long. 118° 13′ 30″ E.

Tidal streams.—At Chapel island, in the southwest monsoon, the flood stream has been observed to set northward 1½ knots an hour at springs; the streams turned at the time of high water at Amoy and the ebb set southwestward about 2 knots an hour.

At about 280° 5 miles from Chapel island, in the northeast monsoon, the ebb stream sets west-southwestward at its commencement, then southwest, and the last 3 hours southeast, running a distance of 3¾ knots during the tide; the flood stream sets northward 4½ knots during the tide. It appears from the above that the tidal streams are somewhat of a rotary character near Chapel island.

Chapman patch, about 3 miles southwestward of Table head, is a rocky patch with depths of 9 to 15 feet over it; a pinnacle rock of 5 feet lies on its eastern edge from which the patch extends 300 yards southward, 200 yards westward, and ¼ mile northward.

North Merope, about 1½ miles southeastward of Chapman patch, is a reef of pinnacle rocks, the highest of which dries 8 feet at low water.

Notch island, about 2 miles southwestward of Chapman patch, and nearly 1 mile off the land, is about 300 feet high; rocky reefs extend southward ¼ mile from it, and northwestward 700 yards. Temporary shelter may be obtained during the northeast monsoon under the lee of the island.

Lamtia island lies about 3 miles southerly of Notch island; is about 170 feet high, of basaltic formation, and its southern side rises steeply; a reef extends ½ mile northwestward of it.

South Merope shoal, the western end of which is 127° 3¼ miles from Lamtia island, is 1¾ miles in length east and west, the same distance in width; it is crescent shaped and has only 6 feet on its shoalest part. A bank with irregular soundings of less than 5 fathoms extends from the whole width of the shoal to a point 5 miles northeastward of its western end. There are soundings of 9 and 10 fathoms close seaward of the reef.

The high land of Cork point westward of 260° leads southward; Chapel island northward of 45° leads southeastward; Chin ha point, 350°, leads eastward; the mound on Chin ha point bearing 25° leads westward of the shoal.

Indraft.—It is necessary to guard against an indraft during the flood whilst passing seaward of South Merope shoal.

The coast from House Hill point, the southern extremity of a small islet conected with House hill at low water, to Cork point, off which a reef extends ½ mile, trends 211° 8¾ miles. House hill is low, with the ruins of a house on its summit.

From House Hill point a reef extends south-southwestward ¼ mile, and at low water shows as three distinct patches of dry rocks, the northern of which is awash at high water.

A shallow inlet, called by the natives Chung chou, runs some distance inside House hill; the entrance, across which is a bank of sand, dry in places at low water, is about 1 mile southwestward of the point.

A little more than 1 mile northward of the point are two remarkable pointed sand hills 300 to 400 feet high.

Mount Edmond, 6¼ miles northwestward of Cork point, is 1,500 feet high and a good mark.

Kan kau and Chu, or Clue, bay are two small inlets 10 and 14 miles southward of Chin ha point; both have bars across the entrance. A vessel of about 6 feet draft can get into Kan kau at the top of high water, but will ground inside at half tide. In Chu bay there is deep water above some fishing stakes, but there is not more than 12 feet over the bar at high water; it is a safe but confined anchorage. The passage of these bars must not be attempted without a local pilot.

Red bay, between the southern extreme of Cork point and Black point, which lies west-southwestward 4 miles, is a fair roadstead in the northeast monsoon. The land behind the bay forms low red sand hills. Shun rock, under water, is 1,200 yards eastward of Black point, and Black rocks, 55 feet high, are about 1,200 yards southwestward of the eastern point of the bay. A reef, which covers at high water and with 3 fathoms close-to on its southern side, extends northwestward from Black rocks, leaving a passage for small boats between it and the main at low tide. At 318° 1,400 yards from the southern Black rock is a reef, covered at high water. The water shoals gradually in the bay, in which anchor where convenient. On the northern side of the bay is a village on the right bank of a creek, the entrance to which is dry at low water.

Clearing mark.—The southern Black rock in line with the point off which the rocks lie leads 600 yards southeastward of Shun rock.

Tides and tidal streams.—The tides at Red bay are said to be apparently irregular; the flood tidal stream seems to set eastward and the ebb westward, at a rate not exceeding 1 knot.

Winds.—On this coast during the northeast monsoon the wind is well northward from 2h. to 10h. a. m., and well eastward from 10h. a. m. to 2h. a. m. It is better for deeply laden sailing vessels to anchor in one of the harbors or roadsteads during a strong northeast wind than to keep under way.

Blakeney pass, between Pass rock, the coast to the southward and Hut islet, and the outlying islets and rocks, is useful for steam vessels of small power bound against the northeast monsoon.

Directions.—From the northward, bring Town hill in line with Crab point 238°. When within $\frac{3}{10}$ mile of Crab point steer so as to pass midway between Crab point and Cleft island, then steer so as to keep Hut islet a very little on the port bow; when within ¼ mile of the islet change course so as to pass it about ½ mile to the eastward.

From the southward pass ½ mile southward of Hut islet to clear Tagau rock; when the peaked sand hill at Black point is in line with Crab point bearing 14° keep this mark on until Spire islet and Knob rock are in line; thence pass between Crab point and Cleft islet, not bringing Knob rock open eastward of Cleft islet until Crab point is in line with Town hill, to clear Cleft rocks, then steer 58° with the latter mark on astern. This track leads over the 19-foot bank lying between Hut and Spire islets; to obtain a depth of not less than 6 fathoms, when Hut islet is ¼ mile southwestward steer about 340° and bring the islet to bear 190°; keep it so astern until Spire islet bears 90°, then steer northeastward, between Crab point and Cleft island.

Clearing marks.—Knob rock in line with Cleft islet leads southwestward of Cleft rocks, and Crab point in line with Town hill, 238°, leads between Cleft rocks and Thomson rock to the southward, and Pass rock to the northward.

Crab point lies $2\frac{6}{10}$ miles south-southwesterly from Black point and is the termination of a remarkable headland having several peaks, the highest being 236 feet high; near the western part of the headland there is a large bowlder. At 150 yards southward of the point southward of the highest peak are two rocks which dry 6 feet; and at 600 yards southward of the bowlder is a rock which dries 13 feet, with several sunken rocks around. On the beach, 1¾ miles northward of Crab point, are two rocks, each about 10 feet high.

At 14°, 2½ miles from Crab point, is a remarkable peaked sand hill, the coast between being low and sandy; Black point, dark, table-topped, and rugged, is about 1,600 yards eastward of the sand hill.

Pass rock, 37°, $1\frac{1}{10}$ miles from Crab point, has 6 feet water over it, and depths of 25 feet for 200 yards southward of it.

Cleft islet, 100°, ¾ mile from Crab point, is 54 feet high; a rock above water lies about 150 yards northward of it, with foul ground between.

Cleft rocks are about 600 yards northward of Cleft islet; the southern rock has a depth of 1 foot over it, and the northern is awash at low water.

Outer Cleft islet, 900 yards eastward of Cleft islet, is 6 feet high; between these islets there is an even depth of about 8 fathoms.

Thomson rock, 18°, ½ mile from Outer Cleft islet, has 18 feet water over it, and 5 fathoms close around. There is a small 5-fathom patch 59° 1,600 yards from Outer Cleft islet.

Coast.—The coast from Crab point to Tagau point trends about 208° for a distance of 3 miles and consists of low sand hills.

Tagau point and Hut rocks, which are rocky ledges, portions being above water, extend eastward 1,200 yards from it; Hut islet is about 200 yards within the eastern end of the rocks.

Tagau rock, with 3 feet over it, and 7 to 9 fathoms close around, except on its northern side, lies 200°, 600 yards from Hut islet.

Though a heavy swell rolls around Hut islet fair shelter with winds northward of east-northeast may be obtained in from 4 to 6 fathoms, sand, southward of Tagau point, the fort bearing 348°.

Spire islets, about 2 miles northeastward of Hut islet, are 4 small islets surrounded by rocky ledges. Spire islet, the easternmost, has a square column 69 feet high, and is connected by a ledge to the islet 35 feet high, 166 yards northwestward of it.

Knob rock, 93°, 4¼ miles from Hut islet, is 60 feet high, and there is a bowlder perched on its summit.

Its position is Lat. 23° 54′ 50″ N., Long. 117° 51′ 39″ E.

Tides.—It is high water, full and change, at Knob rock at 11h. 20m.; springs rise 14 feet.

Two boulder point, 348°, 1 mile from Tagau point, has red sand hills and cliffs 30 feet high.

Baker rock, 65°, about 1 mile from Hut islet, has 3 feet over it, and 3 to 4 fathoms within 200 yards northward of it.

Shoal.—A shoal with 3¼ to 4 fathoms over it extends from ½ mile northeastward of Hut islet to about 800 yards southwestward of the southwestern Spire islet, and has a general width of 600 yards.

Black head (Hutau shan) is 1¾ miles west-southwestward of Tagan point, and is the southern and most remarkable of 5 separate hills which form the southern part of a peninsula. The hills are smooth and round and there are sandy valleys between. On the northern hill, 312 feet high, named Town hill, is a walled town and several trees.

Hutau shan river flows southwestward on the western side of the head; there is deep water inside its entrance, but it is not available for navigation without being buoyed, as the channels are narrow, intricate, and change.

A spit, some parts of which dry at low water, extends 4¼ miles in a direction of about 240° from Town hill.

Vessels might ride out a strong northerly breeze in 4 fathoms at 600 yards off Black head, but should it increase to a gale, or the wind draw eastward, this anchorage must be immediately quitted; then run through Rees pass and anchor under Chimney island, or in Tongsang harbor, to the southward.

Dansborg island, 170°, 5 miles from Black head, is 1,200 yards long, northeast and southwest, ¼ mile wide, and on it are 3 peaks, each of about 156 feet in height, the top of the island appearing long and flat. North and northwest of the island the water is shoal; there is landing on the southeastern side, but it is difficult.

Skead islet, 40 feet high, is $1\frac{3}{10}$ miles west-northwestward of the southwestern end of Dansborg island, and between them, at 800 yards from the islet, is a rock 30 feet high, with a reef off its western point; there is a reef also off the eastern end of Skead islet.

Ching rock, 345°, $1\frac{4}{10}$ miles from Skead islet, covers at half tide; it is the highest head of a reef of some extent, the northeastern rocks of which break only at low water, and extend 400 yards eastward of its highest part.

Gu rock, 280°, 2 miles from Skead islet, is of small extent and covers at a quarter flood.

Flying fish rock, 305°, $1\frac{8}{10}$ miles from Skead islet, is of small extent, covers at a quarter flood, and there are depths of 5 to 8 fathoms close around it.

Awuta rock, $1\frac{6}{10}$ miles northward of Rees point, and about 600 yards offshore, is above water.

Rees point, $8\frac{3}{4}$ miles southwestward of Black head, with Hutau bay lying between from the southward appears long and sandy, terminating in a rocky mound about 70 feet high.

Rees islands, a group of islands and rocks, extend southeastward $3\frac{3}{4}$ miles from about $1\frac{1}{2}$ miles northeastward of Rees point; the islands are barren and inhabited only by fishermen. A shoal of $2\frac{1}{4}$ fathoms lies 600 yards westward of Chimney island, the northwestern island of the group.

There is anchorage in 6 fathoms 400 yards westward of the black rock off the southern end of the sandy bay, Chimney island; also in 6 fathoms with the southern point of Southeast island bearing 90°, but it can not be recommended.

Rees pass, between Pass islets and Rees islands, has a clear navigable width of 1,400 yards with depths of 8 to 21 fathoms.

Tides and tidal streams.—It is high water, full and change, at Chimney island at 11h. 30m.; springs rise 12 feet.

In October the ebb stream set between 190° and 225° at a greatest rate of $1\frac{1}{4}$ knots; the flood set between 45° and 70°, 1 knot an hour.

At $1\frac{1}{2}$ miles southeastward of Southeast island, the ebb sets between 180° and 215°, $1\frac{1}{2}$ knots, and the flood between 340° and 300°, $1\frac{1}{2}$ knots.

Simplicia rocks are 1,200 yards northeastward of Southeast island, and at their eastern end are several rugged rocks; a reef which dries at low water lies 200 yards northeastward of the eastern rock.

Caution.—Near Rees islands the sea rises quickly after the commencement of a breeze and overtops, so possibly the bottom is uneven.

Pass islets, ½ mile southward of Rees point, are peaked, and about 90 feet high; there is shoal water and foul ground between them and Rees rock. Junks use a channel 400 yards wide between Pass islets and the main, which is deep, but great caution is necessary in steering owing to the chowchow water.

Rees rock, 1¼ miles southward of Pass islets, breaks at about half ebb and is covered at high water springs. East rock, 200 yards eastward of it, breaks at low water.

Thunder head (Kaulitau shan), 5½ miles south-southwestward of Rees point, is 474 feet high; its southern face is steep-to, but there are some rocks about 200 yards off its eastern side.

Fall peak, 3¾ miles northward of the head, and separated from it by a low isthmus, is 930 feet high, very sharp, and makes somewhat like a saddle, but with a deeper indentation.

The inhabitants of and about Thunder head will bring off bullocks, poultry, fish, and vegetables.

Tongsang harbor.—Thunder head is the eastern entrance to the harbor, which is one of the best on this coast. A mud bank, with a least depth of 3¾ fathoms, lies outside the entrance, with Thunder head bearing 70°, distant $1\frac{3}{10}$ miles.

Pagoda island, on which is a pagoda, 294 feet high, lies in the entrance between Thunder head and the point on which is Tongyung town. Rocks and shoal water extend southeastward 600 yards from the eastern point of the northern part of Pagoda island.

Mid islands are ¾ mile northeastward of Pagoda island, and the Sisters islets are about 15° 1½ miles from them. Rocks extend 300 yards from the southern point of the large Mid island, and a mud bank projects northward half a mile from its eastern point.

The eastern shore of the harbor is steep-to until the low isthmus is opened which connects Thunder head with Fall peak; it then becomes shoal, and the larger Sister must not be brought westward of 350°.

Enter the harbor with the Sisters well open eastward of Mid islands, which leads eastward of the entrance mud bank, and anchor under Thunder head, with Fall peak bearing 45° and the northeastern end of Mid island 310°.

Junks anchoring for the tide bring up between Pagoda and Mid islands; when running for this anchorage avoid the rocks southeastward of the eastern point of the northern portion of Pagoda island. The best berth is in 12 fathoms, with the Sisters in line with the opening between Mid islands; but these islands must not be closed nearer than 400 yards, as a mud bank extends off them.

The walled town Tongyung stands on a peninsula westward of Pagoda island, and although the channel between it and the island is 600 yards wide, rocks extend from both shores. Tongsang basin runs northward 11 miles from Mid islands, and there is said to be a river at its head. It has only been partially examined, and 3 fathoms were obtained at the highest point reached, but the channel is very narrow. On the western side of the basin is a boat passage into Chauan basin, the entrance to which bears 270° from Fall peak. Northward of the basin is Greene range, 3,067 feet high, and remarkable for its rugged appearance. Water was readily procured in the harbor in the dry season.

Rock.—A pinnacle rock, with a depth of 13 feet over it at low water, and a depth of 6 to 9 fathoms around, on which the steamship *Yunnan* struck, is situated at a distance of 2 miles 182° from the pagoda on Pagoda island.

Caution.—When running into Tongsang harbor, if the wind is fresh outside reduce sail in time, for violent squalls come down from Thunder head.

Tides.—It is high water, full and change, in Tongsang harbor at 11h. 30m.; springs rise 12 feet. The rate of the flood stream is three-quarters of a knot at springs.

Brothers islets.—The southeastern of these islets lies 154°, 12½ miles from Thunder head, is 150 feet high, has a bluff at its southern end, and a reef extending northwestward from it. The northwestern islet, 312°, 1¾ miles from the southeastern, is 80 feet high and has a remarkable square top. The channel between the islets has depths of 19 to 21 fathoms and is clear, with the exception of the reef before mentioned.

Cone point, 234°, 6½ miles from Thunder head, rises to a peak, 890 feet high, and the land at its head is a sandy plain very little above high water, the distance across which to Chauan bay is only 2¼ miles.

A peaked rock, 30 feet high, with another rock ¼ mile northeastward of it, lies off Cone point.

The depths in the vicinity of this point appear to have decreased considerably since the date of the survey, as H. B. M. surveying vessel *Waterwitch*, when running a line of soundings between Square islet and Tongsang harbor, obtained a depth of 7 fathoms at a distance of 3½ miles, 203°, from Cone point; a depth of 5 fathoms, rock, at a distance of 1¼ miles, 163°, from Cone point, the soundings between these positions decreasing from 7 to 5 fathoms; and a depth of 7 fathoms at a distance of 4 miles, 80°, from Cone point, the depths between the two last positions increasing from 5 to 7 fathoms.

Jokako point, 232°, 5 miles from Cone point, is an isolated hill 640 feet high. Jokako bay lies between Cone point and Jokako point. Jokako peak, 2¼ miles northwestward of the point, is 880 feet high and conical.

The ebb tidal stream off Jokako point has been observed to set southwestward 4½ knots in one tide.

Cliff islet is about 1,400 yards eastward of Jokako point; a reef extends 200 yards northwestward of the islet, otherwise the channel between the islet and the point is clear. Square islet, about 1¼ miles northeastward of Cliff islet, is 317 feet high and perforated.

Bell island, about 1 mile southwesterly of Jokako point, is about 260 feet high and perforated, northwest and southeast, at its southern end. There is an islet northward of it about 250 feet high, and a reef extends off its northwestern end which contracts the channel between it and the land to about 400 yards; vessels should not use this channel.

Owick bay, between Owick point, about 4 miles westward of Jokako point and Chauan head, is protected eastward by a narrow isthmus, having two rocks off Owick point, its southern extreme. There is shelter from northerly winds with smooth water in 3½ fathoms, mud, when the outer of these rocks bears 135°. Immediately eastward of this bay is a remarkable sand patch. This anchorage should not be used during the typhoon months as it is unsafe with southwesterly winds.

Do not anchor in this bay after dark in less than 5 fathoms as the distance from the land is very deceptive.

The ground for from 2 to 5 miles south of this bay is much encumbered with fishing stakes.

Chauan bay.—Chauan head, 392 feet high, about 3 miles westward of Owick point, is the eastern entrance point to Chauan bay. The bay affords some shelter during the southwest monsoon, but in the northeast monsoon it runs far enough back to allow the sea to rise. On the eastern side of the entrance is Kwadra island, and at 600 yards southwestward of the island is a reef awash at low water. Shoal water, which may be detected by its color, extends upward of 1 mile from the northwestern side of the bay. Do not attempt to cross the bar at less than half flood, when at the deepest part there are 12 to 14 feet.

Anchor in 6 fathoms with the center of Kwadra island bearing 135°, or further up the bay in 3 fathoms with the southern end of High island in line with Chauan head.

Tides.—It is high water, full and change, in Chauan bay at 11h. 0m.; springs rise 10 feet.

Shoal.—A narrow bank of sand and mud, with a least depth of 2 fathoms over it, extends in a north-northeast direction for 1½ miles from the northern extremity of Kwadra island where it joins the shoal water at the head of the bay.

Dioyu reef, 254°, about 7 miles from Chauan head, consists of several rocks, some heads of which are just awash at high water, in the shape of a horseshoe open eastward. The reef is about 120 yards long, with a breadth externally of 100 yards; the inner water has a breadth of 50 yards and forms to all appearance a natural dock. There seems to be a depth of 7 fathoms close to the reef.

Chelsiu rocks, 220°, about 7 miles from Chauan head, are six in number, about 6 feet above high water, and extend 1,400 yards north and south. The rocks appear as large bowlders lying considerably apart on easterly or westerly bearings.

Gibson rock, 183°, about 8½ miles from Chauan head, with 20 feet over it at low water with East point, Namoa island, bearing 275° and Lamock island high light-house 187°, distant 10½ miles. A tide rip usually marks the vicinity in fine weather.

Fort head, about 13 miles west by south from Chauan point, is 330 feet high. It is the eastern entrance point to Challum bay.

Challum bay, westward of Fort head, affords good shelter during the northeast monsoon, and it is also a good anchorage with strong easterly to east-southeasterly winds. Supplies of wood and water are easily obtained from the villages round the bay, and fish and wild fowl are abundant.

The anchorage is between Middle islet, a barren rock, and Entrance island, in 6 to 3 fathoms; the bay northward of Entrance island is shoal.

To enter this bay pass 400 yards eastward of Middle islet, as a shoal with 11 feet over its end extends 1,800 yards westward of Fort head; then steer for the eastern point of Entrance island; the water shoals suddenly on the eastern side of the channel, and there is a sandbank which shows at low water, lying nearly ½ mile southward of the western end of Challum island.

At about 300 yards eastward of Fort head is a cluster of rocks 6 feet high, and there is a similar rock about a mile further northeastward in the bay between Fort head and Difficult point.

Difficult islet, 63°, nearly 3 miles from Fort head, is 110 feet high. On the highest hill over Difficult point (the point westward of the islet) is a square fort about 550 feet above the sea.

Ternate rock, 80°, 1¼ miles from the summit of Difficult islet, has only 1 foot of water on it. Namoa peak in line with Pagoda islet, 209° leads close eastward of the rock.

Bay.—At 6½ miles northeastward of Difficult point is the entrance to a shallow bay, with a pagoda on an island within it. The boundary line of the two provinces Fuhkien and Kuangtung, passes through this bay.

Namoa island, southward of Challum bay, is 12 miles long, east and west. and 5¾ miles wide at its broadest or eastern part, is separated from the main by a channel about 3½ miles wide with depths varying from 3 to 6 fathoms. The three peaks of this island, West peak, 1,919 feet; Namoa peak, 1,892 feet; and Saddle peak, 1,722 feet high, are prominent.

Notwithstanding its barrenness the island is exceedingly populous, the fisheries affording a livelihood to the greater portion of the inhabitants. Caution is required to avoid the large fishing stakes which almost surround this island in deep water, some of which are heavy enough to cause serious damage to a ship. The passage inside the island is lined on both sides with these stakes.

There are four towns on Namoa island, the largest of which, Lung'ao, is situated on the narrowest part of the island and contains a population of about 7,000; but the principal of them, and the residence of the military mandarin, is the walled town Nan'ao, in the northeastern part of the island, which has a population of about 4,000.

On the east coast is Cheng'ao, with 1,500, and on the eastern side of South bay is Wan'ao, with 2,000 people.

Nangaou bay, eastward of Saddle peak, has at its head the walled town Nangaou, the residence of the magistrate of the district. Vessels drawing less than 18 feet enter this bay until Pagoda islet, on its eastern side, bears 80°; during the northeast monsoon there is a considerable swell in the bay, and then the entrance to Challum bay is a better anchorage.

North point of Namoa, eastward of Nangaou bay, rises to a double peak, 575 feet high, and rocks extend 600 yards northeastward of the point.

Shoal bay is a deep indentation in the northern coast of Namoa about midway between West and Saddle peaks. There are two islets and several rocks in it, and the land is low at its head, where the island is only 1 mile across.

A bench mark /|\ has been cut in a rock the center of a small sandy beach on the eastern side of Bay island. It is 11 feet 4 inches above the level of low water, spring tides.

Baylis bay is the little bight on the western side of Namoa, northward of Clipper point; there is a fort on the ridge westward of it, and an outwork on the beach. Three knolls lie off this bay; the outer, with 11 feet over it, is ⅓ mile offshore.

A bank commences at Baylis bay that borders the northwestern coast of Namoa for 2½ miles, and it extends 800 yards offshore abreast of Steward's house; the lead gives no warning, and there are only 9 feet on its edge.

There is anchorage off Baylis bay during the northeast monsoon in 5 to 6 fathoms, and in Clipper road, which is between Brig and Namoa islands, in the southwest monsoon in 6 to 7 fathoms, good holding ground; the swell in Baylis bay in the southwest monsoon is inconvenient. These anchorages are more safe roadsteads than harbors, as from the rate of the tidal streams and the fetch of the sea, laden boats frequently have much difficulty in passing to and fro. Water may be procured with great facility, and there is no difficulty in obtaining fresh provisions.

Local knowledge is necessary when approaching these anchorages from the southward, as the knolls southwestward of Clipper point have a least depth of only 2 fathoms and shift. The channel northward of Namoa has general depths of 7 to 4 fathoms.

Breakers have been observed, during a moderate southerly swell, on the sand knolls situated 3½ miles to the southwestward of Clipper point.

Brig island, 302 feet high, lies 2 miles northwestward of Baylis bay.

Fort island, 2 miles southwestward of Brig island, makes double on northerly bearings, and there is a fort on the table-land at its western end; the channel between the island and the main is shoal.

Folkstone rock, with only 5 feet on it, lies with the southern end of Brig island bearing 242°, distant nearly 2¼ miles.

The southern end of Brig island just open northwestward of Fort island leads southward of Folkstone rock, and also of the shoal which extends northward of a line from Brig island to Breaker island; the latter is a peaked rock about 200 feet high; a rock lies close westward of it, and others between it and the island to the northward. A patch of 2¾ fathoms lies 86°, nearly 3 miles from Breaker island, northward and westward of which is shoal water.

Obelisk island is about ⅓ mile long in a north and south direction. It lies 1½ miles southward of East point and 600 yards from the shore of Namoa island.

East point is base and cliffy and rises to a summit 185 feet high.

Hart rock, with 4½ fathoms on it at low water, lies 1,400 yards eastward of East point.

Glengyle rock is of small extent, has 2½ fathoms over it, and breaks at low water springs; it lies 900 yards eastward of the southeastern point of Namoa island, with the southern point of Obelisk island bearing 350°, ½ mile.

Three Chimney bluff is a bold bluff 380 feet high, with three towers on its summit, of which the center one has been whitewashed.

Yeng rock, 4¼ miles 108° from Three Chimney bluff, is awash at low water. North point of Namoa island open of East point leads northeastward.

Tide rips.—In the channel immediately south of Three Chimney bluff the depths are very uneven, varying from 5 to 17 fathoms over rock and sand. and there are usually heavy tide rips in the channel during the northeast monsoon season.

The northern point of Crab island in line with Three Chimney bluff bearing 266°, leads southward of Glengyle rock; and Dome island midway between Oeste and Ruff rocks, bearing 209°, leads eastward of it.

A wreck was lying in 1877 500 yards southwestward of the rock.

Pagoda and South bays.—The southern coast of Namoa from Clipper point trends eastward for 5 miles to a small bay with a pagoda upon its eastern point. South bay, the western point of which is 1¼ miles farther eastward, affords good shelter in the northeast monsoon. Kaipan rock, with 15 feet water over it, lies 1 mile off the western entrance point of South bay, with the pagoda bearing 315° $2\frac{1}{10}$ miles. Tamsui rock, also with 18 feet water over it, lies $1\frac{7}{10}$ miles off the western entrance point of South bay, with the pagoda bearing 320° $2\frac{8}{10}$ miles. Rocks extend 300 yards southward from South point, the eastern point of the bay. About ½ mile southeastward of South point is Crab islet, 120 feet high, and the ground is foul between it and Namoa.

The town of Wan'ao is situated on the eastern shore of South bay.

A bench mark ↑ has been cut in the southeastern face of a rock at the northern end of the sandy beach immediately north of South point. It is 13 feet 8 inches above the level of low water spring tides.

A rocky patch, with a least depth of 27 feet over it, lies 600 yards to the southeastward of Crab islet.

Tides and tidal streams.—It is high water, full and change, at Bay island, Shoal bay, at 1h. 30m. (approximate); springs rise about 10 feet, neaps rise about 7 feet; but both time and height are irregular and depend largely on the direction and force of the wind. The tidal streams on the northern side of the island run parallel to it at the rate of 1 to 3 knots; off Nangaou bay they are not so strong as at the western end of the island. The flood sets to the eastward, and the streams change from 1 to 3 hours before high and low water by the shore, the flood usually running longer that the ebb.

On the south side of the island the flood sets about east-northeast, and attains a velocity of 2 knots off Three Chimney bluff where it changes its direction to the northeastward, and in the offing has a strength of 1½ knots.

Half-tide reef is 500 yards in extent and lies 1½ miles 147° from Three Chimney bluff. The shoaler portions of it dry from 5 to 7 feet.

Lamon islets consist of four principal islets, viz, Dome islet, Plat islet, Oeste rock, and Ruff rock, with other rocks and reefs to the southward of the latter.

Dome islet, the northernmost, is 127 feet high and lies 2¼ miles 167° from Three Chimney bluff.

Plat islet is flat-topped and only 42 feet in height; it is situated 3 miles 244° from Dome islet.

Oeste and Ruff rocks are respectively 94 and 85 feet high. Oeste rock lies 1 mile southeastward from Plat islet, and Ruff rock is 1¼ miles eastward of Oeste rock.

Shoal water of 4 to 5 fathoms is found at a distance of from ½ mile to 1¼ miles off the west side of Plat islet; there is rather deeper water between it and the islet. A rock, with a depth of 5½ fathoms over it, lies 1$\frac{2}{10}$ miles 296° from the northern point of Plat islet.

Between Plat islet and Oeste rock the depths vary between 4½ and 19 fathoms, this causing a considerable tide rip.

Southward of Ruff rock are Dot rock and Sul rocks. The former is awash at high water; the latter is a group of rocks, about 600 yards long north and south, which dry from 4 to 7 feet. The southern extremes of Plat islet and Oeste rock in line 317° lead southwestward of Sul rocks.

Shoals and rocks.—A rock, with a depth of 17 feet over it at low water, lies 800 yards 259° from the center of Dome islet, and there are depths of 4¾ fathoms at 1,200 yards 169° from the islet, and 4¼ fathoms at 800 yards 121°.

Mackinnon rock, situated 1,400 yards 66° from the northern point of Plat islet, is a pinnacle with 5 feet on it at low water. It breaks heavily in a swell.

The northern end of Plat islet bearing 210° leads westward, but over a depth of 5¾ fathoms situated 900 yards to the northwestward of the rock; Dome islet 82° leads northward, and Oeste rock 191° leads eastward of Mackinnon rock.

Norway rock is a dangerous pinnacle with 13 feet over it at low water. It lies 1 mile 135° from the northernmost of the Sul rocks. During the strength of the tide, in calm weather, a rip indicates the position of this danger. The depths immediately surrounding it vary from 10 to 15 fathoms.

Sinta rock, a pinnacle with only 2 feet over it, lies 4¾ miles 144° from Dome islet, with the south extreme of Ruff rock in line with the southeastern part of Plat islet.

Lamock islands, a group of four islets and two patches of rocks, extend northeast and southwest 7½ miles.

High Lamock, near the center of the group and 132° 12$\frac{3}{10}$ miles from Three Chimney bluff of Namoa island, is covered with brush wood. The channel between it and White rock is clear, with depths of 8 to 16 fathoms.

Lights.—On the summit of High Lamock island a round black tower, 54 feet high, exhibits, at 241 feet above high water, an intermittent white light, showing thus: Light 18 seconds, eclipse 2 seconds.

which should be seen from a distance of 22 miles. The keepers' dwellings and wall are white.

Low light.—A fixed red light is exhibited at 55 feet above high water from a window in a white building, 18 feet high, on the southern slope of High Lamock island, which should be seen from a distance of 8 miles between the bearings 34° and 50°, covering White and Boat rocks. Outside this arc of 16° the light gradually wanes for 4° on each side, and in clear weather a faint light is visible beyond these limits when close to the light.

Fog signal.—The keepers of the light-house on the summit of High Lamock island on hearing a vessel's fog signal fire 3 guns with 2 minutes' interval between each, and repeat the firing after 12 minutes if the vessel's fog signal continues to be heard.

East Lamock island is about 1 mile northeastward of High Lamock; rocks extend about 1,400 yards southwestward of East Lamock and leave only a narrow channel between them and High Lamock. Two islets or rocks lie within ¾ mile northeastward of East Lamock; of these, North rock has a pyramid on it and is without vegetation.

Times rock, 38° 1¼ miles from North rock, is a pinnacle with only 9 feet water over it at low water and deep water close around.

High Lamock island open westward of East Lamock island leads westward, and open eastward leads eastward of this rock. To pass northeastward of the rock the angle subtended by the Lamock islands must not extend 5° when High Lamock is shut in.

White rock, 3 miles southwestward of High Lamock and one of a group of rocks and reefs, is sufficiently large to afford shelter to a boat.

Boat rocks, 4 miles southwestward of High Lamock, are two square rocks 15 feet above high water, about 800 yards apart, 285° and 105°. A rock lies about 800 yards southwestward of the eastern of these square rocks, and several reefs between them. The western extreme of East Lamock in line with the eastern extreme of High Lamock, bearing 33°, leads 1 mile southeastward of them.

Five-fathom patches lie, respectively, 5 miles 281° and 3½ miles 305° from Lamock island high light-house. A sounding of 6 fathoms was obtained from H. B. M. S. *Alacrity* in May, 1906, to the southwestward of the above-mentioned patches, in a position from which Sul rocks bore 324°, distant 5½ miles.

Current.—In September, in a position with High Lamock island bearing 80°, distant 14 miles, the current during a period of 24 hours sets northeastward at a rate of about 1½ miles during the flood and ½ mile during the ebb.

Tidal streams.—In April, with High Lamock island bearing 95°, distant 17 miles, the ebb stream set between 230° and 200° at the rate of 1½ knots, and the flood between 60° and 110° at about the same rate.

In September, with High Lamock bearing 80°, distant 4 miles, the ebb stream sets between 170° and 280°, about 1 knot, the flood 45° 10½ knots during the tide.

In passing inside the Lamock islands attention to the tidal streams is necessary.

Between Namoa island and Lamock islands, during the southwest monsoon, the flood stream runs northeastward with a velocity of 1½ knots and the ebb sets south-southwest 1 knot per hour.

The sea bed between Namoa island and Lamock islands is very uneven, the depths over it varying from 6 or 8 to 20 fathoms. The shoaler spots are frequently marked by ripplings.

Steamers' track.—In steaming against a strong northeast monsoon take every opportunity of obtaining shelter; the following course is recommended in daylight and clear weather: Pass 2 miles inside Boat rocks, Lamock light-house, and Times rock, which track leaves Sinta rock about 3½ miles to the westward. Steam vessels proceeding against the northeast monsoon at night when the wind is strong should pass westward of the Lamock islands.

Han river approach.—**Dove rock,** with only 7 feet on it at low water, lies 220° 9 miles from Clipper point; a reef with 15 to 18 feet on it extends 400 yards northeastward of the rock.

Buoy.—A red and black checkered automatic whistle buoy is moored in 4½ fathoms about 400 yards southeastward of the rock.

Pagoda hill, 259° 7 miles from Clipper point and on the northern side of Han river entrance looks like an island; there is a pagoda on its summit, the top of which is 257 feet above high water. Thence the low sandy coast trends southwestward toward Double island and terminates in an extensive sand spit which leaves the channel northward of Double island only about 800 yards wide, and forms a bay inside which there is good shelter for junks, numbers entering at high water; that portion of the bank immediately opposite Double island is steep-to.

Joachim bank faces the low land southwestward of Pagoda hill; Brig island, open its own breadth eastward of Fort island 31°, leads over in not less than 15 feet at low water springs.

The southern part of the bank is named Joachim spit.

Outer flat, on which there is a depth of about 2 fathoms, stretches 155°, $1\frac{9}{10}$ mlies from its northern end, which is 55° 1,600 yards from the eastern end of Sugarloaf island. There are heavy rollers on the flat after strong breezes.

Peaked rock, 25 feet high, lies close to the shore off the southern entrance to the Han river.

Sugarloaf island (Taksu), about 1,200 yards northwestward of Peaked rock, is 200 feet high; about 400 yards east-southeastward of it are two rocks, the northern of which dries 8 feet, the southern being 1 foot above high water.

Light.—On the eastern end of the summit of Sugarloaf island a circular red iron light-house, 22 feet high, exhibits at 200 feet above high water a fixed white light varied by a red flash every half min- the low sandy coast trends southwestward toward Double island

The keepers' dwellings are white.

Sugarloaf channel, between Sugarloaf island and the land abreast it, although only 400 yards wide, is excellent, and it is always used by steam vessels, and frequently by sailing vessels.

Double island, 800 yards northwestward of Sugarloaf, only appears double on northwesterly bearings. The white walls and housetops are noticeable from seaward; the custom-house is on the western side. The principal inhabitants are Chinese. The southern hill of this island, 126 feet in height, is the higher and has a square top, being the walls of an old fort. At 600 yards south-southeastward of the summit, and 300 yards offshore, are rocks which dry 5 feet; the channel between them and Sugarloaf should not be used.

Port Swatau, opened to foreign trade by the treaty of Tientsin in 1858, is on the Han river; it is the shipping port of Chauchufu, the capital of the province.

Navigable depths.—Swatau can be reached at high water by vessels drawing 22½ feet at springs, and 21 feet at neaps, during the northeast monsoon, and 21½ feet at springs, and 20 feet at neaps, in the southwest monsoon.

Han river has been navigated to 30 miles above Swatau by a vessel drawing 8 feet, and it is said to be navigable to Tuaka, which is about 23 miles from Swatau and 12 miles from Chauchufu, and to Kiehyang, on a western branch of the river. A branch of the river runs to Chauchufu from Swatau, but it is so shallow that it is only available for flat-bottomed boats.

Pilots.—The pilot station is on Double island, and there are 2 pilots for the port. The pilot boats are painted white, with a broad black band as well as a black ribbon. A vessel making the pilot signal is met as soon as possible by a pilot from the station, but it is usual to telegraph from the port of departure for a pilot, in which case he waits off Bill islet. The pilots are Europeans and under the direct control of the commissioner of customs.

Fisherman island, about 75 feet high, is ½ mile westward of Double island and forms with it the continuation of Sugarloaf channel.

Fishing stakes.—Between Double island and the anchorage off Swatau are numerous rows of fishing stakes, some of which are much in the way of navigation at night. In daylight they form a very good guide for the main channel inside the harbor as they are placed in deep water on either side. Off the stakes off the southwestern point of Double island are frequent buoys to mark the fishing nets, as many as 6 being sometimes stretched across the channel. A white light is usually exhibited from the outer stake, but these lights are unreliable.

Caution.—Vessels occasionally come into collision with the fishing stakes, whilst boats have been frequently swept by the tidal streams against the submerged nets, in several instances with loss of life.

Clearing marks.—The northern summit of Kakchio promontory in line with the southern extreme of Double island, 274°, leads ¾ mile northward of Dove rock; the northern extreme of Fisherman island just open northward of Sugarloaf island, 289°, leads ¾ mile southward; the eastern extreme of Green islet in line with the northern part of High cape summit, 219°, leads nearly 1 mile eastward; and Brig island, its own breadth open eastward of Fort island, 31°, leads ¾ mile westward.

Kakchio promontory, 4 miles westward of Double island, appears from seaward as one continuous hill, the southern part being 486 feet high and the northern 296 feet; the numerous ravines on it are only seen when close-to.

Bottefurh's rock, 50 feet high, lies a few yards off the northern extreme of Kakchio promontory.

Wyoming rock, about 225 yards north-northwestward of Bottefurh's rock, has 4 feet over it, and a black, conical buoy, surmounted by a black, inverted frustum cage, is moored in 7 fathoms about 120 feet northeastward of the rock.

Cheuto rocks, 256° 400 yards from Bottefurh's rock, are a cluster of 3, one being a pinnacle 3 feet in diameter at its top, the whole occupying a space of 15 feet square, with 4½ to 5 feet over them.

Madras rock, 260° 1,100 yards from Bottefurh's rock, is a pinnacle with 6 feet over it; and a black conical buoy, surmounted by a black spherical cage, is moored in 2½ fathoms about 120 feet northward of the rock.

There is a dolphin and a red mooring buoy southeastward of Madras rock.

Gochang rocks lie with Gochang point bearing 149°, distant about 350 yards, and the highest are covered at high water. On the highest rock is a black stone beacon, 5 feet high, surmounted by a shape.

Anchorage.—Foreign merchant vessels anchor immediately fronting Swatau town in 5 to 7 fathoms; good holding ground. Ships of war usually anchor on the southern side of the river abreast the foreign settlement.

Typhoon anchorage.—On the approach of a typhoon vessels usually leave the anchorage off Swatau and anchor just southwestward of the fort on the northern shore at about $1\frac{4}{10}$ miles eastward of the custom-house, where the holding ground is better than in other parts of the harbor and the typhoon can be ridden out in safety.

Harbor lights.—Fixed red lights are exhibited on the northern side of the harbor. From each of the 5 mooring dolphins off the petroleum works; at the German consulate pier; at the western entrance to the boat harbor near the custom-house; on the southern side at the end of the British consulate pier; and from the dolphin southeastward of Madras rock.

Mooring buoys.—There are 4 mooring buoys about 400 yards off Swatau, belonging to steamship owners, and also a buoy to mark the eastern anchoring limit for junks.

About midway between the custom-house and the fort, at nearly $1\frac{1}{10}$ miles eastward, are petroleum works, and opposite the works are 5 mooring dolphins for oil steamers, to which they moor and pump their oil into tanks on shore.

Tides and tidal streams.—It is high water, full and change, at Double island approximately at 3h. 0m., and at about 1 hour later at Swatau boat harbor; springs rise 6 to 9 feet, but the tides are irregular and much influenced by the prevailing winds; thus, with easterly winds of more than force 3, expect high water later and higher, and low water sooner and higher; and with westerly winds of more than force 3, expect high water sooner and lower, and low water later and lower. It is stated that during the southwest monsoon there may be only a 2 or 3 foot rise for a number of days.

It is only after a calm for 1 or 2 days that the water falls to zero, quite irrespectively of the moon's age, consequently there is generally more water on the Outer flat than shown on the chart.

In the northeast monsoon the duration of the ebb and flood streams is nearly equal, the ebb being the stronger and reaching the rate of 3 to 4 knots. The flood stream is said to continue for 1 to $1\frac{1}{2}$ hours after high water on the bar.

There is an automatic tide gauge at Sugarloaf island, showing the depth of water on the bar, which can be read when passing it. Reported to be missing.

Directions.—Vessels should not enter port Swatau on the ebb unless it is flat calm or they are certain of having 5 or 6 feet of water under them, on account of the heavy sea then on the bar. As the tides are difficult to predict, a good way to estimate the depth of water on the bar is to sound at 400 yards northeastward of Bill island, and this sounding reduced by 7 feet gives the least water on the bar at the time, approximately. In approaching port Swatau entrance from the northward pass eastward of Dove rock; therefore do not bring the eastern extreme of Fort island eastward of 5° until the eastern extreme of Green islet is in line with the northern part of High cape summit, then steer for Green islet. When the northern extreme of Fisherman island is in line with the northern extreme of Sugarloaf island steer to pass about 800 yards northward of Bill islet; then steer 326°.

From the southward after rounding Good Hope cape pass eastward of Green islet, South rock, and Bill islet.

From 400 yards northeastward of Bill islet steer 326° with Sugarloaf island a little on the port bow, until Peaked rock bears 270°, when steer through the middle of Sugarloaf channel, giving a fair berth to the position of the 13-foot rock. From abreast this rock steer about 312° until the ruins on the northwestern end of the Double island bear 105°, when steer 285° for about 1½ miles and westward to the anchorage. The fishing stakes must be avoided.

These directions lead in a least depth of about 15 feet at low water.

The eastern extreme of Sugarloaf island, in line with the left-hand edge of the cliff on the eastern point of Double island, which is nearly perpendicular, bearing 326°, leads over the bar in the deepest water.

Sailing vessels using Sugar loaf channel in a light monsoon are liable to lose the wind. The tidal streams set directly through.

The banks in the channel northward of Double island are reported to have shifted, and this channel is not now used except by junks.

Sailing vessels have plenty of room to back and fill when dropping down with the tidal stream toward Double island; if the wind is easterly they generally wait off Double island until it has sufficient northing to enable them to leave the port. If obliged to tack, do not stand close to the southern and eastern shores, as during the northeast monsoon there is generally a swell setting in, especially between Green and Bill islets.

Swatau.—The British consulate is on the southern side of the river, at the foot of Kakchio promontory, immediately facing Swatau town. The consular buildings are on a small piece of level ground, together with a few other houses and a Chinese street, and at the eastern end of the settlement there is a disused sugar refinery. The consular jetty is built of rough blocks of granite.

The residences of the other foreigners are widely scattered, but a few are near the town, in front of which, along the river, are several handsome houses, including that of the Chinese maritime customs.

A large expanse of mud is left dry, or covered only with a few inches of water, on both banks of the river at low tide, and a tract of land has been reclaimed and two boat harbors have been formed opposite the custom-house and along the foreshore of Swatau town.

The military mandarin resides at the small picturesque fort on the west of the town, in close proximity to the custom-house.

The population of the town is about 30,000. The inhabitants of the coast in the vicinity of port Swatau are, even now, pirates.

Supplies.—The markets are fairly supplied with beef, mutton, fish, and fruit, and in winter with wild fowl; good poultry is difficult to procure. There are several ship's compradores, who only keep limited stocks of provisions.

Water can be obtained from the Swatau Water Supply Company.

Repairs.—At Swatau there is no dock, and only the very smallest repairs to ships can be executed. The tidal rise is insufficient for the examination of the bottoms of ships grounded on the soft mud.

Hospital.—There is a seamen's hospital and also a private hospital for infectious diseases at Swatau.

Communication.—There is constant steam communication with Hongkong and Amoy, from which places stores of all kinds not obtainable at the port may be procured in a few days. The communication with Fuchau and Shanghai is less frequent.

The Osaka Shosen Kaiska run a line of steamers between Hongkong, Swatau, Amoy, and Tamsui, which competes with the Douglas Steamship Company.

There are frequent steamers to Singapore and Siam. Launches run to a few towns a short distance inland.

There is telegraphic communication by the Imperial Chinese Telegraphs with nearly all the ports of China and the chief towns of the provinces inland. Connection can be made with all stations of the Eastern Extension and Great Northern Telegraph companies, but these companies have no stations at Swatau.

A railway to Chauchufu, a distance of about 32 miles, is under construction.

Coal.—All the British firms at Swatau have coal, but the amount in stock varies greatly. This is for the most part obtained by the firms for their own steamers, and is Japanese and Hongay dust; the Japanese coal is about $12 a ton, and the Hongay dust slightly cheaper. Coaling is usually done in the stream from lighters.

Not more than 4,000 tons of coal are likely to be in stock at any one time.

Wharves.—There are no wharves in the port, only pontoons with bridge connections to the shore; these pontoons are the property of the shipping companies, and there is sufficient water alongside them for the ordinary coasting steamers, though these vessels sometimes take the ground at low water.

Storm signals are shown from the customs signal station.

Time signals.—The time ball is dropped at the flagstaff of the harbor master's office at noon, Swatau mean time, equivalent to 16h. 13m. 05s. Greenwich mean time, every Saturday. A gun, on an open space near the boat harbor, is fired simultaneously with the drop of the ball. These signals can not be depended on and must not be used for rating chronometers.

Trade.—In 1905 the value of the foreign imports amounted to $11,107,030, and the native exports to $10,404,560; the total value of the trade amounted to $36,205,790.

In the same year 1,162 vessels, with an aggregate tonnage of 1,306,165 tons, entered the port. In addition, there is a large inland trade by means of small steamers.

The principal imports are cotton goods, opium, tin, kerosene oil, rice, flour, and fish, also beans and bean cake from the north of China; the principal exports are bean oil, paper, fruit, clothing, and grass cloth; also feathers, hair, hemp, sugar, tea, and tobacco.

Kieh yang, a town about 25 miles above Swatau, is the head center of the sugar cane district of southern China.

Climate.—Swatau is considered by some authorities to be the healthiest port in China. During the summer, although the thermometer ranges as high as at Hongkong, a refreshing sea breeze tempers the heat throughout the day. Namoa peak, clearly and distinctly seen from Swatau, is considered to presage fine and settled weather.

Only two typhoons visited Swatau between 1898 and 1900.

Peaked rock, 25 feet high, off the southern entrance point of Sugar Loaf channel, is a very good mark. The coast for over 1 mile northwestward of it is fringed with low-water rocks; the coast southward is rocky with conspicuous sandy bays and several detached rocks some distance offshore.

A rock awash at low water lies 150° 1,200 yards from Peaked rock; Green islet, in line with Good Hope cape, or the commissioner's flagstaff on Double island, open northward of Peaked rock, lead eastward of it.

Bill islet, 50 feet high, is 2½ miles southeastward of Peaked rock and nearly 1 mile offshore. Squat rock lies 600 yards south-southeastward of Bill islet: part of it is a large square stone about 15 feet high; and a quarter of a mile southwestward of Squat rock is a reef over 200 yards in extent, which always breaks, being awash at high water.

Squat rock—Shoals.—A shoal, with a depth of 11 feet over it, is situated with Squat rock bearing 320°, distant 700 yards; another shoal, with a depth of 16 feet over it, lies 150 yards 30°, from the above shoal.

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Green islet, 72 feet high, is ½ mile northward of the fort on the western end of the northern face of Good Hope cape, and from its northeastern side rocks extend 200 yards, their outer part being 2 feet above high water, while between the islet and the fort is a rocky reef which is partially above high water.

Good Hope cape, 163 feet high, is the northeastern point of a hilly peninsula, of which High cape summit, 433 feet high, is most prominent on southwesterly bearings, its top appearing flat and falling sharply on both sides.

The northern face of the cape is ½ mile long and terminates westward in a bold point on which is an old fort.

Vincent range, northwestward of the cape, rises to the height of 593 feet at 4¼ miles from High cape summit, and extends for 2 miles with but little difference in height. Between this range and the cape is a plain on which are steep hills 330 feet high.

Signal hill.—At 1½ miles northward of the highest part of Vincent range is Signal hill, on the summit of which, 377 feet high, is the signal station from which vessels are reported; the hill continues almost level to the southward, but it falls steeply to the northward.

Light.—On Good Hope cape a round white iron tower, 22 feet high, exhibits at 171 feet above high water a fixed and intermittent light, thus: Fixed red from 148° to 170°; white, with an eclipse of about 3 seconds' duration every minute, from 170°, through south and west, to 8°; and red, with an eclipse of about 3 seconds' duration every minute, from 8° until shut in by Maurh point. The white light should be seen from a distance of 15 miles and the red 8 miles.

The dwellings and boundary wall are white.

Fog signal.—In foggy weather, in answer to a vessel's fog signal, 2 guns are fired with an interval of 1 minute between them, and if the vessel's fog signal continues to be heard the firing is repeated after an interval of 15 minutes.

Position.—Lat. 23° 14′ 19″ N., Long. 116° 48′ 24″ E.

Tides.—It is high water, full and change, at Good Hope cape at 9h. 0m.; springs rise 6½ feet.

There is a tide race with the flood off Tide point, which at times is very turbulent.

Shoal.—Foul ground, consisting of bowlders on a muddy bottom, with a least depth of 4 fathoms over it and from 6 to 8 fathoms around, exists at a distance of from 800 to 1,000 yards 84° from Good Hope cape.

Hope bay is between the southern part of Good Hope cape and Haimun point, which is about 8½ miles west-southwestward. Detached rocks lie ½ mile offshore for 3½ miles northeastward of Haimun point. This coast must not be closed nearer than 1 mile.

There is secure anchorage in the northeast monsoon northwestward of Tide point, on the southern side of Good Hope cape promontory. The smoothest water is in the first little sandy bay westward of the point, near a fort and a large tree. Sunken rocks extend 200 yards from the fort point; otherwise this bay is clear, and the lead the best guide.

Peaked rock is at the western end of this sandy bay, and 800 yards southwestward of it is Cockchafer rock, a small sunken pinnacle with 4 feet on it at low water and 5 fathoms close-to around.

At 1½ miles northwestward of Peaked rock is the entrance to a creek which leads to Han river, 3 miles above Swatau.. The creek has 7 feet water over the bar, which is barely 200 yards across and is defended by a fort. Reefs extend southwestward 600 yards from this fort to a rock awash at high water, rendering the direct channel impassable to large fishing boats at low water, which at this time of tide leave the rock to the eastward and pass between it and 2 islets off the fort. A wrecked crew wishing to reach Swatau should take this route, as few boats could live in the tide race off the cape.

From a cursory examination possibly a vessel of 12 feet draft might pass the bar and proceed above it for about 1 mile to a point on which there is a fort, but the bar, which is about 150 feet broad, requires great caution. Above the fort the least depth is 5 feet, and the channel is very narrow and intricate throughout.

Haimun bay lies between Haimun point and a rocky headland 7 miles southwestward; it has a general depth of 6 to 7 fathoms and at its head is the entrance of Haimun river with 10 feet on the bar at low water. The town is on the left bank, 1 mile within the entrance, and northward of the town the river turns westward. There is communication by a channel with Han river, through which arms are largely smuggled into the interior.

The highest of the hills at the back of Haimun point are two peaks, on the highest of which, at 590 feet above the sea, is an artificial mound. There are three pagodas on the land northward of the bay, two of which are on the hills, and can be seen in clear weather from Namoa island; the other is on the lowland. West peak is westward of the pagodas.

Caution.—The soundings in Haimun bay are deeper than shown on the chart; caution is therefore necessary when approaching the anchorage at night.

On many occasions vessels have nearly been lost by mistaking Haimun point for Good Hope cape in thick weather, when neither the low, white, sandy shore of Hope bay nor Namoa island were visible. The point and cape much resemble each other, both having three distinct high points with sandy beaches between.

Parkyns rock, at about 210° 1,800 yards from Haimun point, forms two rocks on which the sea does not break except when there is a heavy swell.

Rocks.—A rocky ledge, with only 2½ fathoms on its southern end, extends 1,200 yards from the fort on the eastern point of a sandy bay, 1$\frac{3}{10}$ miles east-southeastward of Rocky Head point, the eastern entrance point of Haimun river. On this ledge is a rock awash at low water, lying ½ mile westward of the fort.

In Haimun river entrance, and with Rocky Head point bearing 41°, distant 1,800 yards, is a rock, dry at low water.

Anchorage.—Haimun bay is not recommended as an anchorage, but it is better for a sailing vessel beating against the northeast monsoon to anchor there than to be carried back around Breaker point. In this case if drawing less than 13 feet, run in under the point, lower a boat, and mark Parkyns rock, and then come in with good way on to windward of the rock and shoot up into the fort bay.

Rocky point is the low extreme of the land about 4 miles southward of the rocky headland at the Southern point of Haimun bay with reefs known to extend ¼ mile southeastward of it, which should not be rounded at a distance of less than 1 mile, thence the coast trends southwestward to Tonglai point about 1¼ miles.

Tonglae point, 1¼ miles southwesterly from Rocky point, about 1 mile westward of it, is the entrance to a creek leading to the walled town Tonglae. On the eastern side near the entrance is a remarkable dome-shaped tower and a low square fort.

There are numerous sunken rocks on this coast, one of which lies 1,200 yards southeastward of Tonglae point.

Anchorage off Tonglae point is unsafe, and should only be used by vessels of 12 feet draft and under in case of necessity.

Breaker point, 4 miles southwestward of Tonglae point, has a fine light-house on it, which is just eastward of a long line of brown-colored land, close to the beach, and easily made out; there is also the black dome-shaped hill, Dome hill, rising 111 feet from a red sand drift on the point, whence the hills trend northward and westward, dipping suddenly at their extremity. Detached reefs lie off the coast, which should not be approached within ½ mile.

Light.—A light-house, 120 feet high, circular, and painted black and white in horizontal bands, on Breaker point, exhibits at 152 feet above high water an intermittent light, showing thus: Light, 8 seconds; eclipse, 2 seconds; which should be seen from a distance of 19 miles.

The light is white seaward between the bearings 53° and 235°, and red inshore of these bearings to the land.

The dwellings and wall are white.

Fog signal.—In answer to a vessel's fog signal, two guns are fired with an interval of 10 seconds between them; and if the vessel's fog signal continues to be heard, the firing is repeated after an interval of 10 minutes.

Position.—The light-house is in Lat. 22° 56′ 25″ N.; Long. 116° 29′ 44″ E.

Wreck.—The wreck of a vessel lies sunk in a position 15 miles 98° from Breaker point. The masts of the wreck are no longer visible, but it is doubtless still a danger to navigation.

Soundings.—At 3 miles southwestward of Breaker point and 3 miles off the land there are depths of 9 fathoms, mud; and at 2 miles southeastward of the point 11 to 12 fathoms, mud. A sounding of 8 fathoms indicates proximity to the reefs.

Current.—Between the Ninepins and Breaker point, the current runs in line with the coast. In the strong northeast monsoon it sets southwestward 2½ miles an hour; and in the southwest monsoon it sets northeastward seldom over 1 mile an hour.

Tides and tidal streams.—It is high water, full and change, at Breaker point at 10 h. 0 m., approximately; springs rise 8 feet.

From January to May, between Hongkong and Breaker point, the ebb tidal stream ran eastward, but generally speaking it was weak. Eastward of Breaker point, the flood stream sets eastward.

Caution.—Numerous fishing vessels are found all along this coast; they are generally in couples, and have a net stretched between them. It is advisable in steam vessels to ease down when surrounded by them, as they generally get out of the way, and constantly altering the helm confuses them.

Coast.—From Breaker point the coast trends westward for about 9 miles to Tungao road; along this stretch there are several overlying rocks.

Flat reef, 1$\frac{3}{10}$ miles southwestward of Breaker point, is 600 yards in extent, rocky, with 2 rocks 8 feet high on it. Black rock, 10 feet high, is ¼ mile westward of the reef.

Sunk rock, 1,400 yards westward of Flat reef, has 7 feet water over it, and is the shoalest part of a rocky patch about 200 yards in extent. A sunken rock, with foul ground extending about 300 yards west-northwest and east-southeast from it, lies about 290° 600 yards from Sunk rock.

Korea rock, a pinnacle with 12 feet water over it and from 3 to 6 fathoms around, is the southern of the rocks lying westward of Breaker point, and from it Breaker point light-house bears 61°, distant 2$\frac{8}{10}$ miles.

The rocks, 25 feet high, off Breaker point in line with the light-house, 56°, leads southward of Korea rock; and the remarkable square stone, 85 feet high, situated on the coast at 4 miles westward of the light-house, bearing northward of 315°, leads southwestward.

Islet.—A small islet, 52 feet high, lies 2$\frac{1}{10}$ miles westward of Breaker point and ½ mile offshore.

There is fair anchorage during the northeast monsoon at ½ mile westward of the islet in 5½ fathoms mud, with Dome hill and the islet in line.

Tungao road.—Tungao village stands in a bight 9 miles westward of Breaker point, and a river flows into the sea at 1¾ miles northwestward of the village. There are 2 pagodas in the vicinity, 1 on the low land at the eastern entrance point of the river, and the other on the hills 2 miles northward. The sea breaks heavily at low water on the bar of the river, and outside the bar the water shoals suddenly.

Tungao road is a fair anchorage in the northeast monsoon, with good holding ground, but a heavy swell often sets in from the southward. The best position is with South Pagoda bearing 338° in 5¼ fathoms.

White rock is about ¼ mile off the land at 2½ miles southeastward of the village; it is 20 feet high, peaked, and white topped. On northeasterly bearings this rock is conspicuous; on westerly to northwesterly bearings it is not so noticeable.

Hailung rock, over which there is a depth of 9 feet, lies with South Pagoda bearing 320°, distant 4¾ miles, and about 1¾ miles southward of White rock.

Coast.—From Tungao the coast trends southwestward for 14 miles to Kupchi point, and is low and sandy.

Black mount, 4½ miles northeastward of Kupchi point and ½ mile from the beach, is a little black conical hill rising from a red sand down; it is 230 feet high, a remarkable landmark, and it can be seen at night. Reefs extend ½ mile from the coast in its vicinity.

Kupchi point has a ragged summit, 210 feet high, and on the coast 600 yards northwestward of the point is a dilapidated fort. A rock with 9 feet water on it lies 200 yards southward of the point. A ledge of rocks extends 400 yards from the point westward of the fort, its outer edge breaking at low water.

Kupchi islet lies 800 yards southward of the point.

Balfour rock, with 15 feet water over it, lies about 1½ miles southeastward of Kupchi point.

Turtle rock, 15 feet high, lies 1 mile southward of Kupchi islet, and between them are 2 rocks and 4 rocky patches.

The bottom in this vicinity is very uneven, and vessels should pass not less than ½ mile southward of Turtle and Balfour rocks.

Rock.—A rock, P. D., on which the steamship *Workfield* is supposed to have struck in 1904, is shown on the chart at a distance of 4¼ miles, 108°, from Kupchi point.

Shag rock, 4 feet above high water, lies 800 yards offshore at 1¾ miles northwestward of Kupchi point, and there are 1½ to 2½ fathoms around it, except on its southeastern side, where there is a fringe reef. A 9-foot patch lies 260° 1,000 yards from the rock. There is anchorage during the northeast monsoon southward of Shag rock, but there is usually a considerable ground swell.

Kiahtsz.—On the mainland, abreast Shag rock, is a fort, with a second a little northward of it, both on the eastern side of the entrance to a river leading to the walled town Kiahtsz. There is also a fort on the western entrance point. The town is 1¾ miles from the entrance, and southward of it is a pagoda two stories high.

There is a depth of 6 feet at low water on the river bar, which is dangerous.

Hutung point is about 8 miles west by south of Kupchi point, and on its western side is the mouth of Hutung river, which has only 6 feet over the bar. On the land forming Hutung point is a fort, and close to the fort is a remarkable dome-shaped building like a large beehive, apparently intended for a fire beacon; this is a good mark in hazy weather, there being nothing resembling it on this coast. At 1¼ miles southeastward of the fort is a small islet, surrounded by reefs and detached rocks, one of which, Figure rock, to the eastward, is of a curious shape.

Hutung peak, 715 feet high, 3 miles northeastward of Hutung point, and Knob peak, 681 feet high, ¾ mile farther northeastward, are conspicuous.

Southeastward of Hutung peak the hills reach to the sea, and at half a mile off the beach is a flat rock, 9 feet high, with sunken rocks between it and the land. There are several rocks off the coast eastward of this flat rock; the outer of these rocks, which is covered, lies 1,600 yards off the beach at nearly midway between the flat rock and Shag rock.

Black rock point is about 3 miles southwestward of Hutung point, and off which is Black rock, a conspicuous islet 30 feet high.

Parry rocks, 243° 1¾ miles from Black rock, have 12 feet over them.

Coast.—From Black rock point the coast trends about 240° to Tongmi point, a distance of 5½ miles.

Tongmi point is the southern point of the promontory of which Chino peak is the highest part. At 1,000 yards eastward of Tongmi point there is a group of rocks above water, one of which, Thumb rock, is 15 feet high.

Suwonada rock, 130° 1,500 yards from Tongmi point, is a pinnacle with 15 feet water on it.

Tungki rocks, 141° 2,200 yards from Tongmi point, are a small group of black rocks, the highest of which is 20 feet high.

Caution.—Do not pass between Tungki rocks and the land.

Hiechechin bay lies between Tongmi point and Chilang point, 248° $14\frac{3}{4}$ miles from the former; the entrance of Hiechechin bay is between these points, and it is $10\frac{1}{2}$ miles deep.

There are depths of 9 to 10 fathoms across the entrance of the bay, which gradually decrease within it.

On the western shore of the bay is mount Simpson, 1,773 feet high; and 2 ranges of stony hills rise from the northeastern side of the bay, culminating in the well-defined Round mountain, 1,439 feet, and Nipple mountain, 949 feet high.

Two rivers discharge into the head of the bay, where the land is flat and swampy.

The shores of Hiechechin bay are densely populated, Kieshiwei, on the eastern side, being the principal town. In moderate weather the bay and its approaches are crowded with fishing boats.

Anchorage, protected except from southerly winds, can be obtained during both monsoons; but in the northeast monsoon the swell is felt in all the bay.

Siki, about 8 miles southwestward of Tongmi point, is a small rugged islet, with 2 granite hummocks, the higher being 45 feet above the sea.

There is a patch of 6 fathoms a little over 1 mile southward of Siki which should be avoided, the rocks off this coast being of a pinnacle nature.

Simpson rock, 310° $\frac{1}{2}$ mile from Siki, is a patch 300 yards in length, northeast and southwest, and 150 yards broad, with 18 feet water on it.

Chino bay is on the eastern side of Hiechechin bay, between Kinsiang point and a point about $1\frac{7}{10}$ miles northwestward of Tongmi point. On the northern side of the bay there is much foul ground and several remarkable, precipitous rocks, among which are West White stone, 65 feet high, 129° $2\frac{4}{10}$ miles from Kinsiang point; East White stone, 64 feet high and with vertical sides, 105° $1\frac{2}{10}$ miles from West White stone; and Double stone, 39 feet high, $\frac{1}{2}$ mile southeastward of West White stone. Yellow stone, 43 feet high, lies 143° $1\frac{1}{10}$ miles from East White stone. In Chino bay there are numerous rocks and shoals, and the muddy discoloration of the water in the bay prevents any of them being seen.

Sarah Lucy rocks, 134° $1\frac{3}{10}$ miles from Yellow stone, are 2 pinnacles with 2 feet water over them, on which the sea seldom breaks.

Bassard rock, 170° $1\frac{1}{2}$ miles from Yellow stone, is a pinnacle with 6 feet water over it and steep-to around; the sea does not break on it.

Arnold rocks, about $\frac{1}{2}$ mile southeastward of Bassard rock, are 2 pinnacles, 200 yards apart, each having 15 feet water over it.

Observatory bowlder, the top of which is 60 feet high, is a conspicuous block of granite standing on a mound on the shore 93° from Yellow stone; it is in Lat. 22° 48′ 14″ N., Long. 115° 47′ 46″ E.

Anchorage.—During the northeast monsoon there is good anchorage in Chino bay with Yellow stone bearing 280°, distant 1,600 to 1,800 yards in 3 to 4 fathoms, mud; and northwestward of Chino peak, in 3½ fathoms, sand. The swell rolling round Tongmi point reaches both these anchorages.

Directions.—Vessels of much draft must anchor well out in Chino bay. The most convenient berth for communicating with Kieshi wei is eastward of Yellow stone; for this anchorage keep Yellow stone eastward of north until ¾ mile from it, when steer northeastward for the anchorage.

If taking the inshore route against the northeast monsoon, the best anchorage is northwestward of Chino peak, for which the chart is the guide.

Landing is tolerable in most parts of Chino bay during the northeast monsoon.

Tides.—It is high water, at full and change, near Observatory bowlder at 8h. 0m.; springs rise 5 feet, neaps 2½ feet. In February, 1886, there was one high and one low water, succeeded by a second high and low water of considerably diminished range daily; the difference between the heights of the inferior high and low water being sometimes a few inches only.

Chino peak, 1,200 yards southeastward of the southeastern point of the bay, is conspicuous, sharp, rocky, and 432 feet high.

Chino reef extends nearly 600 yards off the land at about 800 yards southeastward of the southeastern point of the bay; it is rocky and some of the rocks are awash.

Kinsiang point, the northern point of Hiechechin bay, is a conspicuous hill 156 feet high. There are numerous villages in the neighborhood, and anchorage for vessels of 10 feet draft and under may be obtained at ½ mile northwestward of the point.

Paukshao peninsula is about 5 miles northward of Chilang point; Paukshao point is its northeastern end; a rock with 10 feet water on it is situated 250 yards northward of the point.

Paukshao bay, northwestward and westward of the peninsula, is shallow, and its southwestern portion dries at low water. In the mouth of the bay, northwest of Paukshao point, there is good anchorage for vessels of moderate draft, well protected except from winds between east-southeast through east, and north.

Kinyu islet lies about 40° 4 miles from Chilang point; it is rugged, and its northern end is a precipitous rocky summit, 87 feet high. A rock 60 feet high lies about 200 yards eastward of its northern end.

Chilang point is of moderate height, and composed of red sand, with many rugged rocks on it. There is a conspicuous bowlder. 103 feet high, at ¼ mile northward of it. The land on either side of the point for some distance is of a remarkable red color with black mounds.

Chilang rock, 110 feet high, is separated from the point by a narrow unnavigable channel.

During the northeast monsoon there is good anchorage at 400 yards westward of Chilang point in 6 to 7 fathoms, sand and mud.

Light.—It is intended to place a light on Chilang point.

Flat rock, 10 feet high, is 1¾ miles westward of Chilang point, and a small sunken rock lies northwestward of it.

Middle reef, which is awash, lies 2⅕ miles westward of Flat rock and 1¼ miles offshore. The depth in the channel between Middle reef and the reefs off the Reef islets is 6 to 8 fathoms. The passage inshore of Middle reef should not be attempted.

Reef islets lie 4 miles southwestward of Chilang point. The northern islets are surrounded by reefs for the distance of 400 yards, and a reef extends 200 yards southward from the eastern end of the southern islet, which is 35 to 40 feet high.

Goat island, about 175 feet high, lying 3 miles northwestward of Reef islets, is the southern end of a tongue of rocks and shoal water extending off the land. A rock, which shows only when the tide is low and with strong winds, lies southwestward 1½ miles from the western point of the island.

At 1¾ miles inland from the beach northward of Goat island is the walled town, Chiap cheng.

Anchorage.—There is anchorage in the northeast monsoon between Tsiech point and Goat island, which with the rocks northward of it affords some shelter from the heavy sea. This roadstead is very convenient and was much used by opium vessels, which approached as close to the shelving beach as the depth of water allowed.

Rocks.—A rock lies 1,800 yards, and a sunken rock on which the sea breaks 1¼ miles, eastward of Goat island.

Tsiech point is the point 3 miles northwestward of Goat island.

Tai sami mound, 970 feet above the sea, is an artificial cone on the highest part of the hills at 2 miles northwestward of Tsiech point.

Tai sami inlet, about 3 miles farther northward, is entered by a channel ½ mile wide, with a depth of 2½ fathoms in it. The northern side of the approach is shoal, and rather more than ½ mile off the beach are some rocks, which dry at low water, and from which the southern entrance point of the inlet bears 130°.

The southern edge of the channel is bordered by a sand bank, which commences under Tai sami mound and extends 1½ miles offshore westward of the southern entrance point, where it shoals suddenly to 3 feet. The northern end of the sandy spit under Entrance hill in line with the conical hill at the back of the town, bearing 82°, leads over the bar, rather on the southern side of the channel, then round the sandy spit at the distance of 200 yards.

There is anchorage westward of Tai sami head with good shelter in the northeast monsoon, but a long, heavy swell rolls in.

Honghai bay lies between Tsiech point on the eastward and Ross head 275°, 19¾ miles to the westward.

The bay is quite open southward, and its northern part is shoal. There are several islands in the bay.

Sailing vessels are recommended to pass eastward of Tung ting and to avoid the northern part of this bay, where the sea is heavier than outside. There is also usually a long ground swell.

Care is required when in the vicinity of this bay at night in fine weather, as it is usually crowded with fishing junks.

Tides.—It is high water, full and change, in Honghai bay, at 10h. 0m.; springs rise 6½ feet.

Shoal bay is at the head of Honghai bay; its entrance, between Mace point and Club point, is 2 miles wide. The depth in the bay is generally less than 2 fathoms. At its northeastern part is an inlet with 6 feet over the bar, which communicates with Hie che chin bay, and is said to be navigable by small boats.

Honghai island, 2 miles southerly of Mace point, is ½ mile long, east and west, 600 yards wide, 240 feet high, and affords some shelter from southerly winds on its northern side. Two rocks, dry at low water, lie 600 yards south-southeastward of it.

Hat islet, 2 miles westward of Honghai island, is a peaked rock with detached rocks around.

Inside island, about 2¾ miles northwestward of Hat islet, is 1 mile long north and south, but little over 200 yards wide, and 460 feet high. Six hundred yards southwestward of it are some detached rocks, and at 800 yards eastward of the island is a rocky patch with 6 feet of water over it. At 3 miles westward of the island is the mouth of a large stream, with only 6 feet over its bar.

Ross head, a headland, which rises to Ross peak, is the western point of Hong hai bay.

Coast.—From Ross head to Fokai point, a distance of 12 miles, the general trend of the coast is south-southwestward; there are a number of outlying rocks off this stretch of coast.

Samchau inlet.—Three miles southwestward of Ross head is an opening ½ mile wide into the extensive Samchau inlet. The southern point of the entrance is flat and rocky. Shoal water, over rocky bottom. extends ¾ mile southward and southeastward of the northern head of the opening, leaving a very narrow channel, in which there is said to be a depth of 5 fathoms close to the southern side of the entrance. In strong easterly winds the sea breaks across the channel.

There is an inner bar with a passage only a few feet across, above which the channel deepens to 8 fathoms, and there is room for a vessel to swing.

Entrance to this inlet is intricate and should not be attempted before an examination of it has been made. The tide and tidal streams, which run at the rate of 5 knots, must be considered.

Depths.—Soundings taken in April, 1906, by the Chinese revenue schooner *Peng tei*, show that the outer bank is extending to the southward and westward. The channel is now not more than 200 yards in width, and is stated to have a depth of 31 feet at low water.

The leading beacons have been removed.

Coast islet, with several rocks around, lies ¾ mile eastward of the northern head of the inlet.

Sunk rock, 114° $3\frac{7}{10}$ miles from Coast islet, often breaks. Mace point, open northwestward of Hat islet, bearing about 53°, leads northwestward.

Single rock, 96° 7½ miles from Coast islet, breaks only at low water or when there is a heavy sea.

Si ting, 116° $5\frac{3}{10}$ miles from Coast islet, is a rocky islet about 50 feet high, with rocks above and below water around.

Tung ting, 122° $6\frac{6}{10}$ miles from Coast islet, is a rocky islet about 50 feet high, with rocks above and below water around.

The depth of water in the vicinity of Si ting and Tung ting is about 9 fathoms.

Pauk piah, a flat rock about 25 feet high, lies 91° 6½ miles from Fokai point.

Whale rocks 193° $2\frac{4}{10}$ miles from Pauk piah, are two rocks on which the sea sometimes breaks, with 12 fathoms close around.

Pedro blanco.—This rock, 140°, 18½ miles from Fokai point, is about 130 feet high, steep-to to ¼ mile with deep water around, and on northerly bearings appears as two rocks; the summit is white.

Position.—Lat. 22° 19′ 00″ N., Long. 115° 07′ 30″ E.

Fokai point is the southeastern extreme of a promontory connected with the main by a low sandy isthmus; the promontory is 670 feet high, and appears to be an island on easterly or westerly bearings. On the hill over the southwestern point is a large fort.

On the northwestern foot of Fokai hills is a fort, with a tall chimney on the hill beyond it; northward of the fort is a creek, which runs northward through the sandy isthmus, and which junks enter at high water.

On the eastern side of Fokai isthmus there are three rocky islets, and 18° $1\frac{7}{10}$ miles from the eastern point of the promontory is a reef which shows at low water.

At nearly 7 miles 30° from Fokai point is a sunken rock.

Harlem peak, 5° 8 miles from Fokai point and 1¾ miles inland, is 2,070 feet in height and conspicuous.

Harlem bay, westward of Fokai isthmus and promontory, affords anchorage, in the northeast monsoon, northward of Hebe islet in any convenient depth of water.

The natives here are not so shy of intercourse as at other places along the coast; they will supply fish and vegetables.

Hebe islet, 70 feet high, is flat-topped, and a ledge of rocks, which covers at high water, extends 600 yards northeastward of it. A 3½-fathoms rocky patch lies 600 yards southwestward of Hebe islet.

Middle rock, 10 feet high, lies 1,200 yards westward of the southwestern point of Fokai promontory, and may be passed on either side.

Mendoza island, 2⅓ miles southwestward of the southwestern point of Fokai promontory, is 480 feet high, 2¾ miles around, and from some directions shows two peaks rather like a saddle; shelter may be obtained from southwesterly winds on its northeastern side. On its western side is a small islet.

Tsinku islet, 167 feet high, lies 1,200 yards northward of Mendoza, with 11 fathoms between; near its center is a remarkable cleft.

Directions—For Harlem bay, round Fokai point at the distance of about ½ mile. With easterly winds in a vessel of moderate size pass eastward of Middle rock and fetch the anchorage without tacking, avoiding the 3½-fathoms patch southwestward of Hebe islet; a large ship should pass westward of Middle rock.

Bias point, 6½ miles northwestward of Mendoza island, is the eastern entrance point of Bias bay, has rocks extending off it ½ mile. A shoal, with 1¼ fathoms over it and 6 fathoms, mud bottom, close around, lies 110° ⅔ mile from Bias point.

Bias bay.—The entrance to Bias bay is between Bias point and Teyi point, 8 miles southwestward; the bay extends thence northwestward 13 miles, and has a greatest width of nearly 20 miles. A chain of islands fronts its western shore, which is indented by two large bays, at the head of the southern of which is Taipung harbor.

Fishing stakes.—The central part of the bay is often thickly studded with strong fishing stakes connected with stout rope gear, which are serious obstacles to navigation by night. A clear passage may be found on the eastern side of the bay in depths of less than 6 fathoms.

Bate island, 1⅙ miles westward of Bias point, is 1,600 yards long, north and south, and ½ mile wide; there is a rock southeastward of it, a sunken rock at 400 yards north-northeastward, and a rock, awash at high water, 1,200 yards north-northeastward.

Triple islet lies 2 miles northward of Bate island; 200 yards eastward of the islet is a small rock nearly awash.

There is anchorage in the northeast monsoon between Bate island and Triple islet.

Tsang chau, a low, flat islet, with a smaller one southeastward of it, is on the eastern side of the bay and on the southern side of the entrance to Fan lo kong. The eastern shore of the bay trends northward $8\frac{6}{10}$ miles to this islet from Bias point.

Fan lo kong harbor, in the northeastern part of Bias bay, is 1½ miles wide at its entrance, with a depth in mid-channel of 4 fathoms. At 4 miles northeastward of Tsang chau the soundings decrease to 3 fathoms, and thence shoal water extends 2 miles farther to the head of the harbor. Fan lo kong village is on the northeastern shore. This is the best anchorage in Bias bay in a typhoon.

Rocks.—A rock with 4 feet water on it lies with the center of Tsang chau bearing 198° $2\frac{3}{10}$ miles; and a rock with 6 feet water on it lies with the center of Tsang chau bearing 156° $2\frac{8}{10}$ miles.

Lokaup island, the southern of the chain of islands in Bias bay, is about 2 miles long, and nearly separated in two places; the highest part, 330 feet above the sea, is near the southern end, off which there are some pyramidal rocks. There is anchorage on either side of it, according to the direction of the wind.

There are 6 islets around Lokaup, 3 on the southwest, 2 on the north, and 1 on the east. The Pillars, the northern islet, is remarkable from two square pillars on its southern side. A reef extends 800 yards from the northern point of Lokaup, near the northern end of which is Lokaup rock, 4 feet high. A shoal, with 4½ fathoms over it and 7 fathoms around, lies 346° 900 yards from Pillar summit.

Middle group, about 1 mile northward of the Pillars, consists of six islets. Green islet, 262 feet high, the southern, has Hat rock close southwestward of it, and there is a 13-foot rock 300 yards eastward of it; Square islet is about 800 yards north-northeastward of the eastern end of Green islet, whence Hole islet, Red islet, and Tree islet continue northward for $1\frac{2}{10}$ miles. Reef islet lies about 1 mile northward of Green islet; there is a reef that breaks at low water ¼ mile southeastward of it, and a rock, awash at low water, 600 yards northward of it.

Harbor group consists of nine islets; the southern are the Twins, two small islets, situate about 1,800 yards northward of Tree islet; at ¼ mile northeastward of the Twins is Shoal islet, with rocky ground, on some parts of which are only 3 feet water, extending 600 yards northwestward from it. At ¼ mile westward of the Twins is Tree-a-top islet, with Sugarloaf island, 320 feet high, ½ mile farther westward.

Fairway rocks, awash at low water, lie nearly 1,200 yards southwestward of Tree-a-top islet.

Narrow islet, ¾ mile long, north and south, 400 yards wide, and 281 feet high, is 600 yards northward of Shoal islet. A shoal with 17 feet on it extends west-northwestward nearly 1 mile from between Shoal and Narrow islets, and there is a 15-foot patch 1 mile westward of Narrow islet. Round islet lies 500 yards northward of Narrow islet, with a depth of 4¼ fathoms between them; about 200 yards northward of it is Flat rock, nearly awash and steep-to. At 1,200 yards northwestward of Round islet is Cone islet, 113 feet high, surrounded by reefs; and a group of islets and rocks extends west-northwestward from Round islet to the mainland.

Big island, 1,200 yards northeastward of a point on the mainland, is about 1,600 yards long, northeast and southwest, 800 yards wide, and 364 feet high. North Tree islet is close off its northern side, and 600 yards farther northward is North Rock, a flat rock with a reef, which shows only at low water. Sand cay, a low rock surmounted by sand, lies 800 yards northwestward of the island, and there is a rock awash at high water on the southern side of Big island.

Fisherman rock, nearly in mid-channel between Big island and the main, shows at half tide.

Low islet, with another islet immediately northwestward of it, lies 1¼ miles northward of Cone islet; Kai pan rock, over which there is less than 6 feet at low water, bears 254° 1 mile from Low islet.

Taipung harbor, so named from the walled town Taipung on its northern shore, although contracted affords good shelter to moderate-sized vessels, except with easterly winds. On the northern side of the harbor is Cone hill, off which a shoal extends ½ mile from the shore; the southern side, which is bold-to, must therefore be kept aboard. Vessels drawing more than 15 feet should not proceed farther westward than the third point on the southern side, as the head of the harbor is shoal.

Dumbell bay, the inlet northward of Taipung harbor, trends westward 6 miles from Big island, and has a general depth of 2 to 3 fathoms.

Tides.—It is high water, full and change, in Dumbell bay at 10h. 0m.; springs rise 7½ feet.

Tidal streams.—In April the current off Bias bay sets constantly westward, its rate, which did not exceed 1 knot, increasing with the flood. When the monsoon drift current recedes from the coast, tidal influences prevail, and the flood stream is said to set westward and the ebb eastward, or the reverse of the set of the streams northward of Breaker point.

Directions.—Sailing vessels when working westward must not bring Bate island eastward of 3° until Tsinku island bears southward of east, to clear Middle rocks. Thence proceed up the bay to an anchorage in 5 fathoms, about 1½ miles from the eastern shore, 3 miles northward of Triple island, or southward of Lokaup to an anchorage in the bay or in Taipung harbor. There are several populous villages on the eastern shore where refreshments might be obtained.

Middle rocks, which lie 3½ miles eastward of Teyi point, are just awash at high water. A reef, which breaks only at low water, lies 600 yards southwestward of the rocks.

Tuni ang, about 2 miles southerly of Teyi point, is about 2 miles long, east and west, 1 mile wide, and its southern part rises conically to the height of 960 feet; some islets and rocks with foul ground around extend about 1,800 yards westward of the northwestern point of the island; Net islet, the nearest, is sugar-loaf shaped; Peak rock, 80 feet high, lying ¼ mile westward of Net islet, appears like two islets with a shingle beach connecting them; at 800 yards northwestward of Peak rock is a ledge of rocks, the northern edge of which is always above water, and between is a reef which breaks at low water.

The channel between Tuni ang island and Teyi point is clear, with the exception of the rocks above mentioned, and a ledge extending southwestward from the point eastward of White rock. Cone islet and an islet westward of it are each about 400 yards southward of Tuni ang.

Samun island is 1$\frac{3}{10}$ miles long, northeast and southwest, about 800 yards wide, 269 feet high, and distant 1 mile from Tuni ang; the channel between it and Cone islet is not quite 400 yards wide, with 9 fathoms of water.

Anchorage.—In the northeast monsoon junks anchor in 9 fathoms southward of Net islet and Peak rock and abreast a fort on Tuni ang, but the ground is foul within 400 yards of the fort point. The best anchorage is in Samun road westward of the southwestern point of Cone islet in 7 to 8 fathoms, and sheltered from winds between west-northwest through northeast and south. During southwesterly winds there is anchorage in 9 and 10 fathoms on the northern side of Tuni ang and in 10 to 12 fathoms northeastward of Cone islet.

Tide.—It is high water, full and change, at Tuni ang at 9h. 0m.; springs rise 5½ feet.

Single islet, 1¾ miles south-southeastward of Samun island, is 200 feet high, with a rounded top.

Akong, a remarkable pyramidal rock, lies 1,200 yards northeastward of Single islet, with 15 fathoms between.

Rock.—A rock with 16 feet over it, which rises so abruptly that it is difficult to find, lies about 35° 1 mile from Akong.

The coast of the peninsula separating Bias and Mirs bays trends west-southwestward 8 miles from Teyi point to Mirs point; Coast islet, about 2¼ miles eastward of Mirs point, lies 600 yards off the western entrance point of a sandy bay. There is another sandy bay nearly 3 miles eastward of Coast islet; White rock, which is remarkable, lies ½ mile eastward of the eastern entrance point of this bay. The peninsula is mountainous and reaches in Chiyung shan a height of 2,810 feet.

Mirs point.—The land within the point rises to the height of 1,200 feet. Griffin rock lies close off the southern part of the point; at 1$\frac{2}{10}$ miles eastward of the rock and 400 yards offshore are some rocks, the point within which is perforated.

Mirs bay.—Fung head is situated west-southwestward 5½ miles from Mirs point, and between is the entrance to Mirs bay, which extends northwestward about 12 miles.

The land in the vicinity of Mirs bay is high. Ma on shan, or Hunchbank hills, 2,315 feet high, at 9 miles westward of Fung head, and Sharp peak, 1,540 feet high, at 2 miles within the head, are conspicuous.

Shek ngau chau (Gau tau), a rocky islet about 2½ miles within the entrance, is 86 feet high.

Breaker reef, a rocky ledge 600 yards long, northwest and southeast, lies ½ mile southwestward of Shek ngau chau. The center part of the reef dries 5 feet and is generally to be seen breaking.

Peng chau, 140 feet high, is in the northeastern part of Mirs bay and 4½ miles northward of Gau tau. Its geological formation is different from that of the adjacent land, being alluvial, and its beaches are of shale stones.

There is good anchorage in 7 fathoms during the northeast monsoon between it and the mainland northeastward, but it is much obstructed by fishing stakes. East Cone, a remarkable peak, 750 feet high, lies east-northeastward of Peng chau and on the northern part of the isthmus, dividing Mirs from Taipung bay. This isthmus is 1¼ miles across and low.

There is a peaked rock and a sunken reef in the bay westward of it.

Dangers.—A rocky patch, with a depth of 4 fathoms over it, lies just over ¼ mile south of the south point of Peng chau, and another, with 4¼ fathoms over it, is situated 1$\frac{2}{10}$ miles 99° from the same point. The latter shoal is about ¼ mile long in a north-and-south direction.

Caution is required to avoid the numerous fishing platforms on stakes in 6 to 9 fathoms, especially at night.

Crooked harbor, westward of Crooked island, affords good anchorage in 6 to 7 fathoms, mud. The eastern shore of the harbor is clear, and off the western shore are several islets, of which Ap cheuk

(Robinson island), the northeasternmost, is 86 feet high, and has a reef extending 400 yards northeastward from it.

Young Hebe shoal, with 3 fathoms least water, lies 1,750 yards 357° from the north point of Crooked island. The bank on which it is situated extends to within ½ mile of the northern shore of Mirs bay, and between its southern end and the north point of Crooked island is a channel 1,000 yards wide. The breadth of the bank is nearly ½ mile.

Starling inlet, westward of Crooked harbor, extends for 3 miles from Ledge point in a southwesterly direction, with a breadth of about ¾ mile, the depths gradually decreasing to its head, which is very shallow. The town of Sha tau kok, where there is a Chinese custom-house, stands on its western shore, and a British police station is situated on the northern shore at the head of the inlet.

Round island.—Northwestward of Bluff head lie a group of islands, the largest of which are Tung wan to (Double island), Lo kwai wan to (Crescent island), and Crooked island. Song to (Round island), the easternmost of the group, lies 2 miles 350° from Bluff head.

Cocks head rock, with 22 feet over it, lies 98° 650 yards from Kai tung tau (Peaked head), the easternmost point of Crooked island.

Wang chuk kok hoi runs west-southwestward for 1½ miles from its entrance between Bluff head and Mit kok tsui, and has a breadth of 600 to 800 yards. It affords good anchorage in from 6 to 8 fathoms, mud bottom. The Kang mun, a boat channel, leads through into Double haven from its western end.

Double haven, one of the best anchorages in Mirs bay, and completely landlocked, has an average depth of 7 fathoms over a mud bottom. There are three entrances:

Chut mun, between Crescent and Double islands, having a least depth of 21 feet, and 66 yards wide at its narrowest part, which is just eastward of Unicorn rock, a peaked rock 22 feet high, jutting out from the shore of Double island.

Deep pass, between Crescent island on the east and Tui mui chau and Crooked island on the west, carries from 12 to 15 fathoms, is just over 200 yards wide and clear of danger.

Tsing chau la, the northwestern entrance between Sandy point and Table island, is 400 yards wide, and carries 7 fathoms.

Dangers.—Village rock, drying 5½ feet, lies 109° 700 yards from Sandy point, and 400 yards off the shore of Crooked island.

Middle ground, 350 yards in length west by north and east by south, and 100 yards in width, having near its western end a rock with 6 feet of water over it, lies 1,400 yards 153° from Sandy point.

A rock drying 7 feet is situated 200 yards to the southward of Yuen tsz chek and 350 yards to the northwestward of Middle ground.

Fu yung cheuk tau, a rocky ledge with depths of from 6 to 20 feet over it, and on which is a rock that dries 4 feet, extends nearly 400 yards southeastward from Fu yung cheuk.

Woodman reef, with 2 feet water, extends 300 yards northwestward from the northwest point of Snake island; and Horley rock, with a depth of 5 feet over it, lies 650 yards 58° from Snake island.

North channel, leading into Tolo channel between Port island and Bluff head, is nearly 1¼ miles wide; Tolo channel thence trends about 235° for 7 miles to White head, and is not less than 1,400 yards wide, its shores being steep-to, with a depth varying from 6 to 14 fathoms on the northern shore.

Within the channel at 3¾ miles from Bluff head is Knob reef, the highest part of which is 15 feet high, with a rocky ledge extending northeastward 300 yards from it; Flat reef lies 600 yards southwestward of it; and $1\frac{8}{10}$ miles farther in is Buch reef. Although there is a navigable channel on either side of these reefs, the northern is preferable, being the wider.

Harbor island, 345 feet high and 6 miles within Bluff head, terminates the northern side of Tolo channel, which then separates into 3 arms, Tide cove southwestward, Tolo harbor westward, and Plover cove northeastward.

Jones cove, westward of Long harbor, is 1 mile deep and 600 yards wide; but it, as well as Long harbor, is open to a considerable northerly swell. On the western side are 3 islets, and 350 yards northward of Flat islet, the largest, are 2 rocks awash at high water. A rock, which dries 3 feet, lies 200 yards west-southwest from Flynn point.

Long harbor extends 2½ miles southward, with a breadth of from 1,200 yards to 1 mile, to Stokes point, where it divides into 2 narrow arms. It affords good anchorage in 5 to 8 fathoms.

Dangers.—Le Mottée shoal, with a depth of 12 feet over it, extends 350 yards from the western shore of Grass island, its western extremity is steep-to and lies with the western extremity of Grass island bearing 358°, distant just over 400 yards.

Junk rock, with 4 feet over it, lies with the western extreme of Grass island bearing 347°, distant 1,300 yards.

Warburg rock, with 4¾ fathoms over it, lies with the western extreme of Grass island bearing 0°, distant 1,800 yards.

Phillimore rock, 75 yards across, with a depth of 4½ fathoms over it, lies 250 yards from the western shore of the harbor, and ½ mile southeastward from Ocean point.

Supplies.—Poultry, eggs, and fish may be obtained in limited quantities. Steam launches run every other day between Hongkong and Mirs bay, calling at Sha u chung, Yim tim, and Tap mun.

Anchorage in Long harbor and Jones cove is reserved exclusively for the use of H. B. M. ships.

Grass island is 1¼ miles in length north and south, 1,200 yards wide, and 401 feet high.

Kong chau, 700 yards eastward of Grass island, is a steep black islet, 111 feet high. The passage between Grass island and Kong chau is foul and should not be used.

Waterwitch rock, with a depth of 10 feet over it at low water springs, lies with the eastern extreme of Kong chau bearing 317° distant 600 yards; it is steep-to on its eastern side. The point northward of Bate head, open eastward of South Gau, leads eastward of Waterwitch rock.

The passage between Grass island and Kong chau has many rocks in it.

Channel rock, awash at high water and generally breaking, lies 600 yards northeastward of the northern part of Grass island.

The village of Tap mun is situated up a small cove on the western side of the island.

Port island, 422 feet high, is nearly 1,200 yards northward of Grass island, and a narrow rocky ledge, with pinnacles on it, projects 200 yards northeastward from the island. There is a convenient watering place on its northern side.

The leading mark through Middle channel, between Channel rock and Port island, is a large bowlder on Gruff head in line with the north summit of Harbor island, 251°.

Fishing stakes and nets close together extend from the south end of Grass island to Shek ngau chau.

Tolo harbor—Tai po hu.—At the head of Tolo harbor is Tai po hu, where are situated the governor's bungalow, the magistracy, and the police station. The frontier road, a broad macadamized road 18 miles in length, leads from Tai po hu into Yau ma ti through the Lai chi kok pass at the head of Tide cove.

Tide cove is 3½ miles deep, and the water shoals gradually from 5 fathoms to its head, whence there is a footpath to Kaulung village, the distance across being 2¼ miles and the path rising about midway to 920 feet above the sea.

A rock, which dries 4 feet, lies about 217° 1¾ miles from the western point of White head. There is anchorage in Tide cove in 3 to 4 fathoms, protected in all winds.

There is a police station at the head of the cove, from whence there are several paths leading over the hills to Kau lung city, the principal of which are those passing over the Grasscutters, Shatin, and Kau lung passes.

Plover cove runs northeastward 2½ miles within Harbor island, and has depths of 4 to 6 fathoms. It affords very good anchorage.

South Gau, an islet 96 feet high, is about 1,600 yards northwestward of Bate point. In southwesterly winds there is anchorage in 8 to 10 fathoms westward of the islet.

Bate point, 1$\frac{1}{10}$ miles from Fung head, has two islets off it, and thence the coast trends westward 1¾ miles and northward 1½ miles to a point, 500 yards northward of which is Grass island; South channel between, leading into Long harbor, is barely 100 yards wide, with a depth of 3¼ fathoms in its navigable part, shoals extending from both shores.

Tides and tidal streams.—In Tide cove, at Mirs bay, it is high water, full and change, at 9h. 20m.; springs rise 8 feet; at neaps the water remains nearly at the same level. A double high tide is experienced at times in the northwestern part of Mirs bay. The first high water occurs 3 to 4 hours before the second high water, with a fall of about 1 foot in the interval.

There is a strong indraft into Mirs bay and Rocky harbor during the flood stream.

Fung bay.—Ping point lies 1⅔ miles southward of Fung head, and Fung bay is an inlet extending 1½ miles northwestward between Fung head and Ping point. The bay is 1½ miles wide, and there are two islets and a rock in the middle of it; but it is too open eastward to afford anchorage.

Conic islet lies close off a point of the mainland and ¾ mile southward of Ping point; immediately westward of it is a bay 700 yards wide and ¾ mile deep.

High island, ¾ mile southwestward of Conic island, has an extreme length of 2½ miles, and at its northern end is about the same breadth. It has a well-defined summit 905 feet above the sea.

A bench mark ⊼ has been cut on a rock near the center of the sand beach next southward of the village of She wan on the western coast of High island. This ⊼ is 10 feet 7 inches above the level of low water spring tides.

Between the north side of High island and the main is a channel which dries in parts from 1 to 3 feet.

Town island, 227 feet high; lies 300 yards eastward of Town island is Hole island, which is perforated. Two low islets lie northward of these islands.

The channel between Town and Basalt islands is confined to less than 200 yards in width by islets, and there is a rock which dries 7 feet at 300 yards from the southern shore of Town island. The tidal streams in this channel form chow-chow water, or whirling eddies.

The channel between Town and High islands is very narrow and has a least depth of 19 feet. It is much used by local steam launches plying between Hongkong and Mirs bay.

Basalt island, about ½ mile southward of Town island, is 1,600 yards long north and south, and 569 feet high.

Bluff island, about the same size and shape, and 504 feet high, lies 800 yards west of Basalt island. The southern coasts of both islands are precipitous, the summit of Steepcliff head, the southern extreme of Basalt island, being upward of 300 feet above high water.

The depths in midchannel between these two islands range from 5½ to 10 fathoms, with the exception of a 28-foot rocky patch about 400 yards 112° from the northern end of Bluff island.

Victor rock, which is about 40 feet across, with a depth of 3 fathoms over it and 15 fathoms close around, lies about 101° 4 miles from the summit of Basalt island, and is in the track of vessels proceeding along the coast.

Rocky harbor is between High, Town and Bluff islands on the east and southeast and Keui and Jin islands on the west. The entrance to the harbor between Bluff and Jin islands is about 1 mile wide.

Bay islet, lying 400 yards eastward of Jin island, is 147 feet high; midway between Bay islet and the northern end of Bluff island is a rocky 3-foot patch, eastward of which the depths vary from 3 to 5 fathoms over rocks and sand.

Pyramid rock, 128 feet high, open northeastward of Bluff island, leads northeastward of the 3-foot patch.

Green islet, about 50 feet high, is situated 100 yards west from the southern portion of High island. A rocky patch, with a least depth of 17 feet at low water, lies about 500 yards westward of the islet.

Ninepin group is situated about 2½ miles southerly of Bluff island.

North and South Ninepin, the 2 largest of the group, lie north and south of each other, separated by a channel 400 yards wide.

The southern coast of South Ninepin is a precipitous cliff rising to a summit 360 feet high; the northern part of the island is lower. Close to its southwestern side is a small islet 178 feet high, and there are several smaller islets attached to its northeastern coast. North Ninepin is 337 feet high, and there is a cleft near its northern end. Close to its southwestern and northeastern extremes are small islets, and 50 yards northeast of the latter is a rock which dries 7 feet at spring tides.

North rock, about 1,600 yards 48° from the summit of North Ninepin, is 12 feet above high water. A reef, which dries 6 feet at springs, lies 100 yards southeastward from it; and a rock, having a depth of 4½ fathoms over it, lies nearly 200 yards northerly.

East Ninepin, of sugarloaf appearance on northwesterly and southeasterly bearings, is 208 feet high. It is much smaller than North or South Ninepin, being 200 yards long, northwest and southeast, and little more than 100 yards broad. A smaller islet, 93 feet high, lies 200 yards off its northwestern end, and a rock 19 feet high is situated 200 yards from its western side.

One-foot rock, 1,350 yards 189° from the summit of East Ninepin, has only 1 foot over it at low water and is not easily seen. The southern point of South Ninepin on with Fo tau point 275° leads south of it.

Caution.—The depths in the vicinity of the Ninepin group give no indication of approach.

Table islet, 98 feet high, lies 1½ miles westward of the southern point of Bluff island.

There are many detached rocks and reefs lying from 50 to 600 yards off the mainland westward of Trio and Table islets; there is a good 9-fathom channel between.

Trio islets are 3 in number and lie ½ mile southward of Table islet. The eastern and largest is 130 feet high, and the next in size, 84 feet in height, lies 100 yards southwestward from it. These 2 islets are almost connected by a reef and rocks 8 feet high; 400 yards northwestward of them is the northernmost islet of the group, which is 28 feet high, with a rock 4 feet high close to its eastern side.

Alexander rock, with 3 fathoms over it at low water springs, lies 600 yards 54° from the summit of the largest Trio islet.

Port shelter.—About 1,600 yards northward of Table islet is Jin island (702 feet), with Keui island (707 feet) lying close north of it, with a boat channel between them at half tide. These two islands divide a deep bay into port Shelter and Rocky harbor, in either of which good anchorage, mud bottom, may be obtained by vessels of any size. Port Shelter, the western of the 2, runs northward 5 miles and is separated from Tolo channel, Mirs bay, by an isthmus 1½ miles wide.

Tides.—It is high water, full and change, in port Shelter and Rocky harbor at 8h. 50m. (approximately); springs rise 7 to 9 feet, neaps rise 5 to 6 feet, but the tides are subject to a large diurnal inequality.

Peaked rock lies 300 yards south of Jin island. It is a double rock 44 feet high. A rock, which dries 6 feet at low water, is situated 400 yards east-northeast from it, and 400 yards east by south is a 3-fathom shoal.

The passage between Peaked rock and Jin island is obstructed by foul ground and rocks drying 3 feet at low-water springs.

A 5¾-fathom rocky patch lies off the southwestern part of Jin island at a distance of 600 yards.

Shelter island, 1 mile northwestward of Table islet, is 416 feet high. Shoal water extends nearly 400 yards northward of the island and to a distance of 300 yards from its western side.

There is a 3-fathom patch 400 yards westward of the western point, and a rocky shoal, with a least depth of 3¼ fathoms, lies in mid-channel between the island and the mainland.

Shoal water extends about 400 yards off the mainland shore on the side of port Shelter, westward of Shelter island.

A shoal of rock and sand, 600 yards long north and south, and from 200 to 250 yards broad, lies 1,200 yards northward from the north point of Shelter island and midway between it and the south end of Sharp island. The depths over it vary from 1½ fathoms, near the southern end, to 5 fathoms.

Hebe haven, on the northwestern side of port Shelter, is a snug anchorage for small vessels. A rock, with 2½ fathoms over it at low water, lies 400 yards southeastward from the entrance.

Sharp island is 1¼ miles northward of Shelter island; it rises to a sharp summit 447 feet high. Off its western shore is an islet 95 feet high, which is connected at half tide, and has offlying rocks to a distance of 200 yards southwestward from it.

Inner port Shelter, on the western side of Sharp island, affords good anchorage in 7 fathoms, mud. Northward of it are numerous small islets, rocks, and shoals which extend northward to the mainland.

On the northwestern side of Inner port Shelter is the village of Sai kung, situated on the north side of a small inlet or boat harbor. On the south side of the same inlet, and conspicuous from the anchorage at Inner port Shetler, is a police station, with white buildings, which is in telephonic communication with Hongkong.

Tide islet, 84 feet high, lies about 600 yards northwest of Sharp island. A bench mark ⊼ has been cut on a rock near the center of a sandy beach on the southern side of the islet. This ⊼ is 9 feet 6 inches above the level of low-water springs.

There is a passage between Sharp island and Keui island from 200 to 600 yards wide; toward its northern end is a 2½-fathom rock which lies about 300 yards from the Sharp island shore.

About 600 yards north of the north extreme of Sharp island is a rocky patch with a least depth of 1¾ fathoms over it.

Vessels of moderate draft can proceed through the passage between Sharp and Keui islands and anchor in 4 fathoms to the southward of Sharp island, or pass northward of Im tin tsz, Keui island,

and Urn island into Rocky harbor, in a depth of not less than 19 feet at low water, but the channel is narrow in places, and the chart is the best guide.

There is no channel, except for boats, between Inner port Shelter and the anchorage north of Sharp island.

A Roman Catholic mission with a conspicuous church is established on Im tin tsz.

Steep island, 330 feet high, is 1¼ miles northeastward from the eastern entrance to Fo tow moon and 1,200 yards offshore.

There is a bay in the coast to the northwestward of Steep island, about ¾ mile deep and ½ mile wide, with depths of 6 to 9 fathoms in it, but it is open to easterly winds and swell.

Rocks.—A rock, with a depth of 6 fathoms over it, lies in the approach to the above-mentioned bay at 1,200 yards to the northwestward of Steep island; and a rock with 9 feet water lies 250 yards off the west shore of the island.

CHAPTER X.

HONGKONG TO CANTON.

Vereker banks are two dead coral banks situated about 120 miles southeastward of Hongkong; both are steep-to, with deep water between and around them. North Vereker bank is 11 miles in length northwest and southeast, and 7 miles in breadth, within a depth of 100 fathoms; the least depth on the bank is 35 fathoms, situated in Lat. 21° 04′ N., Long. 116° 02′ E., at about 2 miles southeastward of the middle of the bank.

South Vereker bank is 8 miles in length northwest and southeast, and 4 miles in breadth within a depth of 100 fathoms; the least depth on it is 32 fathoms in Lat. 20° 58′ N., Long. 115° 55′ E., at 2 miles westward of the middle of the bank. The depth between the banks is from 145 to 183 fathoms.

There are heavy overfalls and traveling tide rips in their vicinity.

Current.—In February the prevailing current set between 293° and 247°, ½ to 1 mile an hour; the current at times set to windward, and with calms or light southwesterly winds it set between 158° and 113°, ¼ to 1 mile an hour.

Banks.—A sounding of 32 fathoms, sand and mud, has been obtained southwestward of Vereker banks in Lat. 20° 40′ N., Long. 115° 18′ E., approximately.

A bank of 8 to 12 fathoms is reported (1902) by the U. S. transport *Iris* to lie about 262° 58 miles from South Vereker bank, or about 137° 78 miles from Gap rock.

Pratas island, about 44 miles southeastward of the Vereker banks, and the northeast end of which is in Lat. 20° 42′ 03″ N., Long. 116° 43′ 14″ E., rises from the western side and near the middle of the sunken part of Pratas reef. It is about 1½ miles long, 100° and 280°, ½ mile wide and 40 feet high, of which the scrubby bush, with which it is covered, forms about 10 feet. It is sand, with no mold or earthy matter on it; its shape is that of a horseshoe, inclosing a shallow inlet or lagoon which runs into its western side for about ½ mile and affords shelter to Chinese fishermen who visit it in the early part of the year. Brackish water can be obtained by digging a few feet into the sand. Gannets are numerous.

From the westward the island makes as two detached but contiguous islets, the center being lower than the ends.

In hazy weather, which prevails during the northeast monsoon, the island is seldom visible from a distance of more than 6 miles, and the breakers at the edge of the reef may possibly not be seen until within 1 mile of them.

Pratas reef is an atoll of nearly circular form, inclosing a lagoon of 5 to 10 fathoms, and thickly studded with coral knolls around its margin, but comparatively clear near the middle. Its perimeter has a length of about 40 miles, and the reef is 1 to 2 miles broad. The northern, eastern, and southern sides of the atoll are just dry at low-water springs and steep-to; the western side forms a sunken barrier, across which are two channels leading into the lagoon, one on each side of Pratas island. The north channel, between the island and the edge of the breakers, is about 3 miles wide, and 2¾ fathoms may be carried near the middle of it at low-water springs. The south channel is by far the better of the two, being wider, a little deeper, as well as comparatively free from coral knolls.

Tides.—It is high water, full and change, at Pratas reef at 4h. 0m., approximately; springs rise about 5 feet. There is only one perceptible ebb and one flow in the 24 hours at springs. The highest tide occurs on the third day after full moon, but the tides are very irregular.

Anchorage.—Although Pratas reef is steep-to in most parts, there are several places where, if necessary, anchorage could be obtained outside the breakers, particularly on the western side, abreast the middle of the channels through the sunken part of the reef, and about 2 miles on either side of the island. At each of these places there is anchorage in the northeast monsoon, in 20 to 10 fathoms, but the position abreast the south channel is considered the better, the sunken reef at this part being deeper and the bottom more even than in the north channel. A vessel of light draft might even anchor in safety on the reef, in the middle of the south channel, in 3½ fathoms at low water, or cross it and take up a berth inside the lagoon in 10 fathoms, fine sand.

Caution.—Numerous coral knolls are believed to exist in the channels and lagoon which are not shown on the chart.

Directions.—In the strength of the monsoons it is generally advisable to pass to leeward of the reef on account of the current setting with the wind, for there are no soundings to indicate a near approach to it, and the weather is frequently thick and hazy in its vicinity.

The safest direction to approach the reef is from the westward, the island being on its western side, and the current running northeast or southwest, according to the monsoon. A vessel approaching the reef should be conned from aloft, with the sun well above the horizon, and if possible astern or on the beam, as the bottom can then be seen in 10 fathoms.

To enter the lagoon, the south channel, which is believed to be navigable by vessels drawing 15 feet, is recommended.

Currents in the vicinity of Pratas reef are exceptionally strong and tide rips are frequent, which are occasionally like breakers over a shoal. One of these rips was recently seen at about 42 miles northeastward of the reef.

Hongkong approach.—Tunglung island (Tamtoo), 3½ miles in circumference and 818 feet high, is separated from the mainland by Fotowmoon pass. Tathong point, a rocky peninsula 203 feet high, with steep, black cliffs, juts out for about ¼ mile on the southern side of the island, with which it is connected by a low, narrow neck of land. At about 600 yards southeastward of the northern point of Tunglung is a sunken rock, from which the western end of Steep islet just shows clear of Yi bluff, a remarkable headland, 434 feet high, bearing 26°.

A flat rock, 31 feet high, lies southward of the western point of Tunglung and 200 yards offshore, with reefs inside it.

Fotowmoon pass is 250 yards wide between the rocks which lie off both points, with 3 fathoms water in the channel, and it is only fit for small vessels. A very remarkable fissure in the high land on the northeastern part of Hongkong, a little open southward of the low extreme of the promontory southward of Junk town, leads through the center of the channel.

Rocks.—A patch of rocks, with a least depth of 2 fathoms over them, exist on the northern side of the pass in a position from which the rock (30 feet high) off Fo tow point bears 80° distant 360 yards. There is a depth of 3 fathoms close southward of the rocks.

Anchorage.—There is good anchorage in Tai miu bay, northward of Tung lung, in 6 fathoms, mud, with southeastern extreme of Jan chau bearing 245° and the northern extreme of Tunglung 119°.

Jan chau (Slope island) is a small island 95 feet high, lying about ⅝ mile northwestward of Tung lung.

Futau chau (Junk island), situated ¾ mile north by west of Jan chau, is 320 feet high, grassy, with here and there a few low trees. On its northwestern side is the Chinese custom-house, off which a considerable number of large junks are usually anchored. The island is separated from the mainland on its eastern side by a shallow, rocky passage 300 yards wide.

Siak miu is a small bay immediately northeastward of Futau chau, in the center of which there is anchorage for small vessels in 4 fathoms water. Larger vessels anchor northward of Futau chau in 4¾ to 5 fathoms, mud, where good protection is said to be afforded in a typhoon.

Chung kwang o, an arm of the sea extending for 2¾ miles northward of Futau chau, gradually contracts in width and divides into two small bays near its head.

The northeastern bay is Ap chai wan, with Kam chuk lan, a considerable village, on its shores. The water shoals gradually from 7 fathoms in the southern part of Chung kwang o to 3 fathoms within ¾ mile of its head.

The shoal located on the chart 350 yards 101° from Maun chau does not exist.

Tidal streams.—In Tathong channel the stream sets north-northwest during the rising and south-southeast during the falling tide, the streams turning at about the times of high and low water. The greatest rate of these streams is 1 knot.

In Chung kwang o the streams are very weak and irregular.

In Fotowmoon the stream sets northwest during the rising and southeast during the falling tide, with a rate of 3 knots at springs, but its force is only felt in the pass itself and between Tung lung and Jan chau there is but little stream.

Hongkong island is about 9 miles long, northwest and southeast, 2 to 5½ miles broad, with an area of about 30 square miles, and is separated from the main by Hongkong harbor, Lye mun, and Tathong channel. The appearance of the island is somewhat picturesque, but on the whole generally barren and unprepossessing. It consists generally of rocky ranges, the summit of which, Victoria peak, at the northwestern part of the island, is 1,809 feet above high water. A good military road about 22 statute miles in length encircles the island. The city of Victoria extends 4 miles along the northern side of the island.

The population of Hongkong excluding the New territory was 377,850 by the census taken in 1905.

The island is indented by numerous bays, the most considerable of which are on its southern side. There is good anchorage throughout the channel between the island and the mainland, except in Lye mun pass where the water is deep, but the best is in Hongkong harbor.

Tathong channel, the eastern approach to Hongkong harbor, lies between Hongkong island and the conspicuous island Tung lung.

Ty long head (cape d'Aguilar) is the southeastern point of Hongkong island, and close southward of it are the two green Kau pui chau islets, close together, the highest of which is 140 feet high. An old light tower on the head is very conspicuous.

Signal station.—There is a signal station on Ty long head and communication can be made by the International Code of signals.

Bokhara rocks are two sunken rocks at the southern part of Tathong channel on a bank of sand and rock, which is about 600 yards in extent, with depths of 5 to 10 fathoms over it and surrounded by depths of 13 to 14 fathoms.

Southwest rock is a pinnacle with 15 feet on it near the southern part of the bank and lying 45° 1,500 yards from the southeastern point of Kau pui chau.

Northeast rock is a pinnacle with 21 feet water over it, situated about 350 yards northeastward of Southwest rock.

Buoy.—A black and white checkered buoy is moored close westward of Southwest rock.

Clearing marks.—Taitam head open southward of Kau pui chau leads southward; western end of Futau chau in line with Talong pai, 357°, leads westward; Lo chau summit in line with eastern extreme of Kau pui chau, 201°, leads northwestward; and Pottinger peak in line with Talong pai, 318°, leads northeastward of the rocks.

By night the white sector of cape Collinson light leads eastward of the rocks.

Mfan chau, a flat-topped, steep, cliffy islet, 145 feet high, is situated 1$\frac{1}{10}$ miles northward of Ty long head. Two patches close to each other with 3¼ and 3¾ fathoms water on them lie 400 yards southwestward of this islet.

Taito chau, a steep, cliffy promontory, 174 feet high, covered with low scrub, is situated 300 yards northward of Mfan chau. The coast northward to cape Collinson is rocky, and landing difficult except in a few places.

Shiak o wan is a rocky and open bay immediately northward of Taito chau. It affords no protection for anchoring, and a heavy swell usually sets into it during the northeast monsoon. The head of the bay is foul.

Tathong rock, a flat rock 6 feet above high water and with deep water at the distance of 100 yards around it, lies in the fairway of this channel at 260° about 1¼ miles from Tathong point and 800 yards off Taito chau. By night the white sector of cape Collinson light leads eastward of the rock.

Cape Collinson (Hak kok tau), lies 1¾ miles northward of Taito chau. A small shelf of shoal water extends 50 yards off the cape.

Light.—A light-house on cape Collinson exhibits, at 200 feet above high water, an intermittent white and red light every 10 seconds, thus, light 7 seconds, eclipse 3 seconds, which should be seen from a distance of 16 miles.

The light is white eastward between the bearings 338° and 158°, and red westward between 158° and 338°.

The light-house tower is on top of a dwelling house, all white.

Sai wan bay.—A rocky patch extends from the southeastern point of this bay; and a rock awash lies 300 yards northwestward of Kei pi ha, the point northwestward of Hak kok tau. Naiying pai in line with cape Collinson extreme leads over the rock awash, and the white sector of cape Collinson light leads eastward of it.

Beacons.—A beacon has been erected on the northwestern edge of the small islet (3 feet high) off Lao shui pai.

The light beacon on the 9-foot rock westward of Lye mun is colored white and surmounting globe is red.

Eastern entrance.—Lye mun pass, between the northeastern point of Hongkong island and the mainland, is 450 yards wide, with depths of 16 to 24 fathoms in the center. The shores on either side are nearly steep-to.

The tidal streams set straight through the pass, flood northwestward, ebb southeastward, at the rate of 2 to 3 knots at springs.

Light.—A fixed red light, which should be seen from a distance of 1 mile in clear weather, is exhibited from an iron gibbet on a rock close to the beach and near a joss house on the northern shore of Lyemun at 72° 700 yards from Kung am.

Rocks.—A sunken patch of pinnacle rocks, with a least depth of 9 feet at low water, lies northward of the western fairway entrance to Lye mun, with Kweiling or Devils peak bearing 82° ⅝ mile.

Light beacon.—A concrete pillar surmounted with a staff and globe has been erected on the 9-foot rock, and it exhibits a fixed red light, which should be seen from a distance of 1 mile.

Penguin shoals, in the fairway of the eastern approach, and with their southern end about 400 yards northward of Quarry point, extend 340° about 700 yards, with a breadth of 150 yards. The depth on the shoals is 5 fathoms at lowest water, over sand and shells, with 6 to 8 fathoms around.

Quarry point must not be passed closely, as a dock and patent slips are constructing and reclamation works are in progress there.

Channel rock, 9 feet high, lies in Kaulung bay entrance and 344° 1⅒ miles from Quarry point. There are some 5-fathom patches within ½ mile southeastward and southward of it, and depths of 4½ to 5 fathoms extend about 1,400 yards southwestward from the rock.

Rumsey rock, 4 feet high, lies 52° nearly ½ mile from Chinsalchui point. Some sunken rocks lie northwestward of the Rumsey, the northern of which is marked by a white buoy with a black cross.

Cust rocks, a sunken patch about 400 feet southward of Rumsey rock, are marked by a buoy, painted red with " Cust " in black letters, southward of them. Belcher ridge, a patch of 26 to 30 feet, lies about 250 yards southward of Cust rocks with depths of 8 to 14 fathoms between.

Prosperine rocks, on the southern side of the harbor at about 234° 700 yards from Kellett island, are marked by three white nun buoys forming a triangle on the outer limits of the foul ground.

Fairways.—There are three fairways through the harbor; the Southern, the western end of which commences off the gas works, is bounded on its southern side by the north coast of Hongkong island, and it terminates 400 feet westward of the Canton steamboat wharf, where it connects with the Central fairway. The north side of this fairway is occupied by junks.

The Central fairway is marked at the western entrance by two mark buoys, painted red and white in horizontal stripes, each showing a small fixed red light. This fairway is defined by two lines of buoys runnings east-southeastward.

The buoys on the northern side of the Central fairway are painted red, and numbered with even numbers, those on the southern side are black with odd numbers.

The line of bearing forming the southern limit of the Northern fairway is the breakwater in Causeway bay open of Kellett island 113°. Vessels proceeding through the Southern fairway fly a red pendant; through the Central fairway, a white pendant; and through the Northern fairway, a blue pendant, or International code flags F., C., D., respectively, at their highest masthead.

Anchorage.—By the port regulations vessels are berthed under the superintendence of the harbor master. The usual anchorage for merchant vessels is abreast the city, and anchorages are reserved for British men-of-war eastward of the city and on the western side of Kaulung peninsula; foreign men-of-war moor in Kaulung bay, eastward of the prohibited anchorage, northward of a line drawn 81° from Chinsalchui signal station, and southward and westward of the 5 fathoms contour line, within which limits there are berths for 14 vessels. The depth is from 3 to 13 fathoms, good holding ground.

During the typhoon months the northern part of the harbor is considered preferable in consequence of the shelter afforded by Kaulung peninsula northeastward, from which direction the wind blows hardest.

Merchant vessels arriving in the colony are only permitted to anchor in the following ports, viz, Victoria (within harbor limits), Aberdeen, Sai ki wan (Aldrich bay), Fo tau mun (Tai mui), Kap sing mun, Chung chau, Tai ho (Lantau), Tai po (Tolo harbor), Deep bay, and Sai kung (port Shelter).

Moorings are laid down off the naval dockyard, Hongkong, and off the Royal Naval Depot, Kaulung, for the use of British men-of-war.

Mooring buoys for merchant vessels are laid in lines running in an east-southeasterly direction.

The limits of the anchorages and positions of the mooring buoys are shown on the plans.

Quarantine anchorage.—The quarantine anchorage is within the following boundaries: Western boundary, a line from the western side of Green island to the western side of Stonecutters island; southern boundary, that part of a line having the naval coal sheds at Kaulung bearing 109° lying between the eastern and western boundaries; eastern boundary, a line drawn south from a white mark on Stonecutters island to the southern boundary; northern boundary limit is the depth of 5 fathoms.

Tides.—The tides at Hongkong are very complicated, being influenced by a large diurnal inequality or difference in height of high and low waters of each succeeding tide, which inequality varies throughout the lunation, from nothing at about neaps, to its greatest amount at springs, when there is practically only one tide in the day; but the actual minimum range of the smaller tide does not always occur precisely at springs.

The tides are also affected by the winds, which may increase or diminish the range by 1 foot or more.

The highest tide of the day always precedes the lowest tide; that is to say, the sequence of the movements is as follows: Fall from the higher high tide to the lower low tide, then rise to the lesser high tide, then fall to the higher low tide, whence it rises to the higher high-tide level. For a few days, about neaps, the sequence becomes inversed.

When the sun has north declination, the higher tides about springs occur during the day; and when the sun has south declination, during the night, spring tides occur at about 10 o'clock. High water at full and change is about 9 o'clock.

The range of spring tide is at its maximum, 8 feet, shortly after the sun attains its greatest declination, north or south; and the minimum, about 6 feet, at the equinoxes.

The range of one spring tide during a lunation is generally greater than the other, and when this occurs the greater range is always caused by the high water following the inferior transit of the moon, and the low water next succeeding. This is usually at full moon when the sun has south declination and at new moon when the sun has north declination.

The highest night tides rise about 1 foot higher than the highest day tides.

The tidal datum in Hongkong waters is to be 3 feet 0 inch on the dockyard gauge.

Tidal streams.—In the fairway of the channel between Lye mun and Green island the stream sets westward with a rising and eastward with a falling tide, changing in direction at about high and low water. The rate at times reaches 2 knots, and in Lye mun as much as 3 knots with favorable winds and tides. During the strength of the stream it must be guarded against when going to a buoy. In the various bights, Kaulung bay, etc., the tidal stream is very weak and irregular.

Tide tables for Hongkong are published by the authority of the government of Hongkong.

Pilots.—There are no licensed pilots at Hongkong, but most shipping firms have their own pilots.

Pilots for Macao, Canton, and West river can be obtained at Hongkong.

Directions.—It is advisable for steam vessels to enter Hongkong by Tathong channel and Lye mun pass if drawing over 25 feet water.

Eastern entrance.—Tathong channel and Lye mun pass are clear and deep, excepting Bokhara rocks and Talong pai, which may be passed on either side. This entrance is used by steam vessels, and sometimes also by sailing vessels during the northeast monsoon, but not usually, as the winds are generally baffling under the high land.

At night the white light of cape Collinson leads eastward of Bokhara rocks, Talong pai, and the rocks northwestward of Kei pi ha.

Entering Tathong channel in thick weather or at night, hug Tathong point, the dark headland of Lamtong, pass it at about 600 yards distance, and steer 293° until the western point of Lamtong is abeam, when alter course to 338°; if it is not desirable to proceed into Hongkong harbor, haul over toward either shore, out of the fairway, and anchor as convenient, in 9 or 10 fathoms, but this vicinity is of very even depth, and the soundings, except within the line of projecting points, do not decrease, so caution is necessary in approaching the shore.

When through Lye mun pass, avoid the 9 feet rock northward of the western entrance of the pass, and marked by a light beacon, pass on either side of Penguin shoals, and give a sufficient berth to the shoal water extending off the island northward and eastward of North point.

Heavy-draft vessels should use the passage between Cust rocks buoy and Belcher ridge, then steering for the anchorage.

Hongkong harbor lies between the northern side of the island and the mainland, and extends between lines drawn from the western end of Green island to the western end of Stonecutter's island on the westward, and from North point to the inner end of Kaulung pier on the eastward. Owing to the constant advance in the size, draft, and number of the vessels frequenting the harbor it is probable that the water space will soon be found inadequate for the berthing accommodation required.

As the harbor is only open to the westward, and the effect of westerly gales is mitigated by the large number of outlying islands, it is a very safe anchorage.

Kaulung peninsula projects about 2½ miles southward from the mainland toward Hongkong. Kaulung bay lies on its eastern and Hongham bay on its southeastern sides.

Navigable depths.—Vessels of any draft can enter the harbor, but sailing ships from the westward pass northward and northeastward of Kellett bank, where the least depth in the fairway is 25 feet at low water, or cross the bank, according to their draft. Steam vessels use Sulphur channel, where the least depth is 24 feet at low water.

By Lye mun pass the least depth to be passed over in entering the harbor is 6 fathoms.

The depths given above are at the very lowest low water; there is approximately 1 foot more water at low water ordinary springs.

Harbor works.—Reclamation and sea wall extension works are in progress, and vessels must not approach the said works within 50 yards.

Works for extending the dockyard have been commenced; in connection therewith 2 dolphins have been erected off the dockyard, from each of which a small red light is exhibited. These works include the construction of a tidal basin having an area of 9¼ acres and a depth of 30 feet at low water ordinary springs.

Harbor lights.—A fixed green lamp light is shown from the end of Douglas S. S. Company's wharf, and 2 fixed red lamp lights from Murray pier.

Prohibited anchorages.—The cable ground between the north point of Hongkong island and the southeast point of Kaulung peninsula is marked as follows:

The western limit by 2 posts on the Hongkong shore in line with a white post and the chimney with white face of the pumping station at No. 1 dock on the Kaulung shore.

The eastern limit by a white post and a white obelisk on the Hongkong shore in line with a white post and white obelisk on the Kaulung shore.

By day these 5 posts may be distinguished by their each carrying a red diamond shape. By night 2 of them on each shore display a red light.

The lights are so screened that the easternmost lights do not show to the eastward nor the westernmost lights to the westward.

The cable between Tai kok tsui and the eastern part of Stonecutters island is marked by a white post with red diamond shape at each end.

No vessel of any description shall anchor within the limits of the above-mentioned cable ground, or within 50 yards on either side of the above-mentioned telegraph cable.

Signal stations.—There are signal stations on Victoria peak; Green island; and Blackhead hill, Kaulung.

Time signal.—This signal is made daily (except on government holidays) from a mast at the signal station on the summit of the hill about 200 yards northwestward of Chinsalchui point.

A ball is hoisted halfway up at 0h. 55m. p. m., close up at 0h. 57m. p. m., and dropped by electricity from Tsimshatsui (Kaulung) observatory.

The ball is now dropped at 0h. 36m. 41.86s. p. m. mean time of the Kaulung observatory, or 1 p. m. standard time of the meridian of 120° E. from Greenwich, corresponding to 17h. 0m. 0s. Greenwich mean time.

The standard time of 120° E., or 8 hours fast of Greenwich mean time, has been adopted at Hongkong.

Supplies.—Stores and provisions of every kind can be obtained in abundance, and there is a well-regulated market. Excellent water from the waterworks is supplied to the city and shipping; a new reservoir containing 33,000,000 gallons at Wong nei chung gap was opened in 1899.

Works are in progress for supplying Kaulung peninsula with water by gravitation.

Hospital, etc.—There is a good hospital for seamen, a well-conducted sailors' home, and a seamen's club for man-of-war's men.

Coal.—A large quantity of coal is kept at the naval depot, and also by local firms.

Coaling wharves.—Vessels of 20 feet draft can lie alongside the western side of the jetty forming the torpedo-boat camber at Kaulung by placing lighters of 20 feet beam between them and the wall; the length of berthing is 540 feet.

At the three piers southward of the above camber there is berthing for six vessels of 24 feet draft and 450 to 600 feet in length.

Vessels of 20 feet draft and 400 feet long can be coaled alongside the sea wall northward of the three above piers by placing lighters of 25 feet beam between them and the wall.

There is a depth of 30 feet alongside the coaling pier at Chinsalchui point.

Vessels can not coal alongside any of the wharves on the Hongkong side of the harbor, but coal can be obtained in lighters from the Wanchai coal godown.

Docks.—Kaulung docks in Hongham bay: No. 1 (admiralty) dock is 576 feet long over all, 530 feet on blocks, 83 feet wide at the entrance, and has a depth of 28 feet on the blocks at high-water ordinary springs. No. 2 dock is 371 feet long over all, 74 feet wide at entrance, with 17¼ feet on the blocks at high-water ordinary springs.

No. 3 dock is 264 feet long over all, 49 feet wide at entrance, with 10¼ feet on the blocks at high-water ordinary springs. There are also 2 patent slips.

On Kaulung, eastward of Stonecutters island, is Cosmopolitan dock, 466 feet long over all, 78¾ feet wide at entrance, with 19 feet water on the blocks at high-water ordinary springs.

In Aberdeen harbor (Shek pai wan): Hope dock is 430 feet long over all, 81 feet wide at entrance, with 21 feet on the blocks at high water ordinary springs. Lamont dock is 340 feet long over all, 64 feet wide at entrance, and has 13 feet on the blocks at high-water ordinary springs.

Hope and Lamont docks are used principally for cleaning and painting ships' bottoms.

At Quarry bay a dock 787 feet long over all, 750 feet on the blocks, 86 feet wide at entrance, with a depth of 31 feet on the sill at high-water springs, was building in 1907. There were also 3 patent slips, Nos. 1, 2, and 3—No. 1 to take a vessel 300 feet long and 18 feet draft, and Nos. 2 and 3 to take a vessel 290 feet long and 17 feet draft.

Repairs.—The Dock Company's Kaulung and Cosmopolitan establishments possess every appliance and facility for both the construction and repair of ships and machinery under the supervision of European foremen. The machinery and plant at their Aberdeen establishment is not very extensive.

There are 1,000 feet of wharfage in Hongham bay with a depth alongside of 5 to 45 feet, and steam shears of 100 and 15 tons; and at the Cosmopolitan dock there are 550 feet of wharfage, with depths of 8 to 15 feet alongside, but deepening rapidly off, and steam shears of 20 tons.

Storm signals are made from a mast in front of the police barracks at Kaulung as follows:

A drum indicates the existence of a typhoon in the China sea eastward of Hongkong.

A cone, apex upward, indicates that a typhoon exists northward of Hongkong, or that it is progressing northward.

A cone, apex downward, indicates that a typhoon exists southward of Hongkong, or that it is progressing southward.

A ball indicates the existence of a typhoon westward of Hongkong.

Red signals indicate that the center is believed to be more than 300 miles from the colony, and black signals that it is less than that distance.

These signals are repeated at the flagstaff of the Kaulung Godown Company, at the harbor office, and the stationary guardship.

These signals do not imply that a typhoon is approaching Hongkong.

Local storm warnings are given by firing a gun placed at the foot of the mast whenever a strong gale of wind is expected to blow here.

NOTE.—If special information is urgently required, inquiries may be made at the telegraph company's office in Hongkong, or the police station on Kaulung point.

Night signals.—Two lights placed vertically indicate bad weather in the colony, and that the wind is expected to veer; and two lights placed horizontally that the wind is expected to back.

These signals are repeated on the flagstaff of the Godown Company at Kaulung.

Weather forecasts are issued daily from the observatory. The forecasts and storm warnings are exhibited daily about 11h. a. m. (and also at other hours, day and night, when necessary or while typhoons exist in the China sea), at the telegraph company's office, at Peddar's wharf, at the harbor office, and at the office of the Kaulung Godown Company.

Outward-bound vessels.—When the red drum is hoisted, steamships, if bound to northern, western, or southern ports, should leave at once, and may expect more or less fine weather; if bound for the Philippine islands they may expect to encounter the typhoon. Sailing ships bound for southern and western ports may sail immediately; but those bound for northern or eastern ports should remain in harbor and await further information, even if the wind be westerly at the time.

When the cone, apex upward, is hoisted, southwesterly winds may be expected, and ships leaving harbor are not likely to run any risk from the typhoon; sailing vessels, bound northward, should sail as soon as convenient, to benefit by the southwest breeze.

When the cone, apex downward, is hoisted, to avoid bad weather ships should remain in port until the barometer rises, when danger from the typhoon is past.

When the ball is hoisted, ships leaving for northern, eastern, or southern ports may expect winds from east, round by south, to southwest. Those leaving for western ports run no risk while the barometer continues rising; should the barometer fall, they should be hove to, and subsequently take refuge in some typhoon harbor, but this will rarely occur.

Measured distance.—A measured distance of 6,055 feet, for trying the speed of steamboats, is in the northeastern part of the harbor, the leading mark for which is the summit of Kellett island in line with Wanchai gap 213°.

The mark for the southwestern limit is the head of Kaulung dock shears in line with the southern bowlder of a barren hill bearing 300°;

and the mark for the northeastern limit is Kaulung rock in line with White patch 298°.

The torpedo mine field is periodically laid southward of Stonecutters island, the obstructed area being marked by buoys carrying red flags; the eastern buoy lying about 700 yards south of the southeastern point of the island, and the western buoy about 700 yards west of the eastern buoy; all vessels must keep southward of these buoys.

Obstructions are also sometimes placed northward of Stonecutters island in an area bounded on the west by a line from the northern point of the island to the watering pier at Lychekok, and on the east by a line drawn north-northeast from the government pier to the mainland.

Trade and shipping.—Hongkong being a free port it is impossible to give any correct statistics of its trade, but its enormous extent may be approximately estimated from the fact that shipping, of a total tonnage of 22,650,616 tons, entered and cleared during 1905.

The principal articles of import are coal, rice, sugar, and flour; the principal exports are tea, kerosene oil, rice, paddy, and general cargo.

The industries of the colony include dock work, launch and boat building, cement manufacture, paper making, sugar refining, brick and tile making, rope making, iron foundries, boiler making, glass manufacture, vermilion manufacture, and opium boiling. A considerable part of the boat population is engaged in deep-sea fishing.

Fire.—The fire brigade of Hongkong possesses a powerful floating fire engine for use in the harbor.

Climate.—Hongkong is subject to an excessively hot and a somewhat cool season, coinciding with the southwest and northeast monsoons; it has also a dry and a rainy season. The average annual range of temperature is from 45° to 99°.

The climate for five months in the year is very good, though the temperature is rather subject to sudden fluctuations. The summer months are trying to Europeans, owing to the damp heat.

July and August are the hottest months, the temperature ranging from 73° to 100°, with a difference of 10° between day and night. The city being situated on the northern side of the island under the peak is completely sheltered from the southwest monsoon, which, on the southern side of the island, agreeably tempers the violent heat.

November to January is the coolest period, and the air is often bracing; the temperature occasionally falls below 40°, and ice has been known on the peak, but this is rare; sudden changes frequently take place, a day of almost tropical heat being followed by a cutting northerly wind, for when calms and variables prevail it is hot even in winter, but the northeast wind and overcast sky reduces the temperature; northeasterly gales are common in autumn and spring and last two or three days.

In January, 1893, ice formed both at Hongkong and Kaulung at sea level. The lowest mean temperature registered at the observatory was on the 17th, air 36.2°, damp bulb 30.9°. On the Chu kiang, about 28 miles below Canton, 23° was recorded.

March and April are rainy and foggy, and the damp is so penetrating that the greatest care is required to prevent clothes, books, instruments, stores, etc., from being destroyed or injured by mildew.

The wet season commences in May and continues until the beginning of August, and during this period the rain falls almost without intermission, frequently causing floods which do great damage.

The minimum annual rainfall from 1853 to 1891 was 59.72 inches in 1860 and the maximum 120.66 inches in 1883, the annual mean being 90.17 inches.

Diseases.—Although visited by sickness caused by malaria, for salubrity Hongkong compares favorably with most of the ports of the East, and its healthiness has been greatly increased of late years by sanitary arrangements and excellent water supply.

The most unhealthy years have been those most deficient in rainfall. Dysentery and intermittent fever are not uncommon, and the bilious remittent fever, sometimes nearly allied to yellow fever, occurs in the summer season; smallpox prevails from November to March.

The chief causes of death in 1901 among the non-Chinese resident civil community were plague, phthisis, malaria, and pneumonia. In that year there were more cases of smallpox than usual, and some cholera cases were imported.

The plague first made its appearance in the island in 1894; it recurred in 1898. In 1899 the number of deaths from this disease was 1,428; in 1900, 1,034; and in 1901, 1,562.

Beri beri is common among the Chinese, but the disease is not, as it now exists, very infectious and does not become epidemic.

Neglect of the usual conditions of health, such as exercise, diet, proper clothing, and the like conduce to, and exposure to the rays of the sun, even in winter, almost invariably results in sickness.

Taitam bay, the eastern of the bays on the southern coast of Hongkong, is 2½ miles deep, 1¼ miles wide at the entrance, clear, and with depths of 10 to 5 fathoms. Taitam head, the western entrance point, is a high bluff with 13 fathoms near it, and Ty long head (cape D'Aguilar), off which are the Kau pui chau islets, forms the eastern entrance point. Anchorage and shelter in bad weather can be obtained in Taitam bay.

Water may be obtained at Taitam village on the western shore of the bay.

Beacons.—Two obeliscal beacons, each 30 feet high, have been erected at the head of Taitam bay and in line 357° lead 600 yards westward of Castle rock.

Oliver shoals, the northern end of which lies 1,400 yards southward of Taitam head, extend 500 yards south-southwestward; the least depth obtained on them is 6 fathoms, over coral.

Directions.—To Taitam bay pass either northward of Wag lan, Sun kong, and through Shing shi mun; between Sun kong and Pu toi and through Shing shi mun; or through Lema channel and westward of Castle rock.

For the northern passage give Wag lan and Sun kong a berth of ½ mile, steer through Shing shi mun and thence for the anchorage in 6 fathoms off Taitam village, which position is well sheltered from all except southerly winds, and the islands and rocks contiguous to the entrance prevent much swell entering from this direction. In the upper part of the bay caution is required to avoid the numerous fishing stakes.

Tides and tidal streams.—It is high water, full and change, at Taitam at 9h. 10m.; springs rise 8 feet, neaps 6 feet. There is very little tidal stream in Taitam bay. The ebb stream sets eastward in Shing shi mun, but the streams are greatly influenced by the wind.

Pu toi group lies southeastward of Hongkong island and on the northern side of Lema channel.

Pu toi, the largest island of the group, situated 1½ miles southerly of Ty long head, is 792 feet in height and of barren appearance, there being only a small quantity of brushwood in the valleys. On its southwestern side is a small rocky islet and a boat cove. It is inhabited.

Lo chau (Beaufort island), lying northwestward of Pu toi, and separated from it by a narrow channel, is 878 feet high, flattened at the top and steep around; its northwestern brow has a small peak with a few large and remarkable bowlders on it. It is uninhabited.

Castle rock, 55 feet high and 7 to 10 fathoms around, lies nearly ½ mile southwestward of Lo chau.

Sun kong, about 1½ miles eastward of Lo chau, is a small, uninhabited island covered with grass and small bushes and rising near its center to a peak 476 feet high. Fury rocks, 15 feet high, with rocky and uneven ground around, lie 600 yards northwestward of Sun kong.

Wag lan, about ¾ mile eastward of Sun kong, and the eastern of this group, is a barren rocky islet ½ mile long, north-northeast and south-southwest, only about 120 yards wide, and divided into two parts by a boat passage.

The landing place is at the northwestern part of the southern islet, and three buoys, for the use of vessels taking stores to the island, are moored off it.

Likin rock, of small extent and with 18 feet water over it, lies 400 yards westward of the western point of Wag lan. Branch shoal is a small rocky patch of 6 fathoms 350 yards southwestward of the southern point of Wag lan.

Light.—A light-house, a round iron tower 52 feet high, painted lower half white, upper half red, lantern and keeper's dwellings white, and situated on the summit of the southern Wag lan islet, exhibits at 225 feet above high water a group flashing white light showing 2 flashes in quick succession every 30 seconds, which should be seen, where not obscured by land, from a distance of 22 miles.

Fog signal.—A gun at Wag lan light-house is fired twice, with an interval of 15 seconds between, every 12 minutes in thick or foggy weather.

Communication can be made by the International Code of signals with Wag lan light-house.

Hongkong island.—Southwestern coast.—The bays between Taitam head and the western point of Hongkong island are, with two exceptions, available for anchorage during the northeast monsoon, but they are not recommended during the southwest monsoon in consequence of the swell which makes landing difficult for boats. The bays are small, but generally easy of access, with plenty of water and good holding ground.

Chik chui wan, known to Europeans as Stanley bay, is immediately westward of Taitam peninsula. The chart is a sufficient guide for anchoring. On the narrow neck at the head of the bay, separating it from Taitam bay, is the village of Chik chu or Stanley, where the only conspicuous building is the police station, which is connected by telephone with Victoria. On the higher part of the neck were the barracks for European troops, but their foundations only now exist. The site was found to be very unhealthy and was discarded: the cemetery is visible from the anchorage.

Chung am.—A barren rocky promontory, rising to a height of 450 feet and on the summit of which is a remarkable bowlder, separates Chik chui wan from Kun gu wan, or Chung am. The point of the promontory is known locally as Chung am kok and is free from offlying rocks. Chung am is of no importance.

Nganchau is situated about ¾ mile off the two points of Chung am, and the channel between can be used with care. This island is circular in form and about 230 feet in height; a few patches on its northern side are cultivated. Its coast is fringed with bowlders, several sunken rocks lie off it, and it should be approached by large boats with caution. The outer rocks off Nganchau are, on the western side Nganchau am pai, a sunken rock with 2½ fathoms over it, situated 287° 500 yards from the summit of the island and 250 yards off shore; on the eastern side Nganchau tan pai, with 2 feet on it, lying

40 yards offshore just southward of the eastern point, and there are several scattered bowlders in this locality; also Tsui lan am pai, a rock with 14 feet over it, situated 70 yards off the southern point.

Measured two miles.—Pairs of beacons are erected respectively on Taitam peninsula and the southern slope of Nganchau to indicate a distance of 2 miles, or 12,160 feet. The leading mark is, white painted mark on Putoi island in line with summit of Castle rock 123°.

Tsin shui wan is the bay westward of Chung am, and off the point separating them are 2 steep rocky islets connected by a ridge of sand that covers and uncovers. The highest islet is 92 feet above high water, and is known locally as Makong. Between the islets and the point there is a safe but narrow boat passage, with a depth of 4½ feet. A sunken rock with 18 feet over it, named Makong mi pai, lies 65 yards from the western point of Makong.

Tsin shui wan is clear of rocks and shoals, but there is generally a swell on and landing is attended with inconvenience. There is a long sandy beach at the head of the bay, where boats may usefully practice landing and embarking through surf, and the bay can be recommended for running torpedoes, boat firing, etc.

Sham shui wan, or Deep water bay, the next bay westward of Tsin shui wan, is easy of access and the chart is a sufficient guide. The anchorage is good and well sheltered, but it is unavailable for shipping, as several telegraph cables, which are not laid on any defined line, are landed at the beach at the head of the bay, where is the cable hut and also the pavilion of the Royal Hongkong Golf Club.

On the western side of the bay the chimneys of a pipe and tile manufactory are conspicuous, as well as several houses belonging to the establishment, on the slopes above the works.

There are no rocks or shoals in the bay.

Tung bo chau is 389 feet high and forms a good shelter to Sham shui wan. A rock, which covers at 7 feet rise above the datum, lies 40 yards off the western end of Tung bo chau, and a rock with 10 feet over it, named Tung bo pai, lies 50 yards off the southern point of the island.

The channel between Tung lo chau and Hongkong is 80 yards across, and there is a depth of only 3 feet in the fairway.

Sham shui kok.—A high peninsula with steep cliffy coasts, of which the southern point is called Sham shui kok, separates Sham shui wan from Thint shui wan, the next indentation to the westward. A rocky patch lies just westward of Sham shui kok, and extends for 60 yards offshore with a least depth of 9 feet on it; this is the only offlying shoal.

Thint shui wan is really the passage between Aplichau and Hongkong islands. At its head a narrow channel, called Deep pass, connects it with Aberdeen harbor. The shores of Thint shui wan are foul, and it is not recommended for ships. On its western side a patch of rocks lies 200 yards from Aplichau, near its northeastern point. On the eastern shore there are several small bays and many scattered rocks. The northern small bay might be useful as a temporary anchorage for a small vessel, but great caution is necessary in using any of the indentations in Thint shui wan.

Aplichau is a considerable island, about 1¼ miles in length northwest and southeast, and 640 feet high. Its steep hills are barren of cultivation, but planted with trees on their northern slopes.

A village of some size is situated on its northern side fronting Shek pai or Aberdeen.

Aplichai is a tongue of land at the southeastern end of Aplichau. It is about 200 feet in height with a cliffy coast and nearly isolated.

Immediately southward of the western point of Aplichau is a small bay in which boats or destroyers can obtain sheltered anchorage.

Apli pai (Assistance rock) lies with the southern end of Aplichai bearing 65°, distant 217 yards. The eastern extreme of Magazine island closed by the southwestern extreme of Hongkong island leads southwestward of it, and if this mark can not be seen owing to thick weather, do not bring the eastern end of Magazine island westward of 316°.

Magazine island, the local name of which is Fo yo kok chau chai, is situated about 650 yards westward of the northwestern point of Aplichau with a deep passage between. It is 800 yards long, narrow, and 79 feet high. On its highest part is a conspicuous building with an arched roof, which is a magazine for storing dynamite, and one or two small buildings adjoin it. A small jetty, alongside which a lighter or small steamboat can lie, is situated in the middle of the northern side of the island. A rock, which covers and uncovers, lies close off the eastern point of the island. The western point runs quickly into deep water.

West reef, the native name of which is Lung shan pai, is a rock about 10 feet high, situated 196° 650 yards from the northwestern point of Aplichau. There are deep passages between this reef and both Aplichau and Magazine island, which can be used if desired, but the tidal streams are strong and caution is necessary.

Aberdeen harbor or Shek pai wan divides Aplichau on its northern side from Hongkong, and is safe and well sheltered, but very small. The harbor is so narrow that vessels over 200 feet long can not lie at anchor without blocking the fairway. Owing to the docks at Aberdeen, it is frequently visited by ships of considerable size, but they either go directly into dock or secure between two mooring buoys off the dockyard.

Anchorage.—A short vessel can anchor on the northern side of the harbor in 5 fathoms at low water with the northwestern point of Aplichau (Fo yo kok) bearing 213°; dockyard manager's house, 84°; police station, 90°; conspicuous clump of bamboos in the Chinese cemetery on the northern side of the entrance, 286°; this clump of bamboos is useful when anchoring at night. A long vessel can anchor in the middle with Fo yo kok bearing 160°, distant 300 yards.

Fishing vessels resort to Aberdeen in great numbers and the harbor is generally crowded with them.

Rocks.—There are a few scattered rocks off the northwestern entrance point of the harbor, which must be guarded against by boats. Pollux rock, the outer one, is awash at low-water springs. The eastern end of Magazine island in line with the western extreme of Aplichau leads outside these rocks.

Tidal streams.—It is high water, full and change, at Aberdeen at practically the same time as at Hongkong harbor. The flood stream sets westward through Deep pass and attains a rate of 2 to 3 knots at springs; the stream in the pass turns at about high and low water. In the western part of the harbor there is very little stream. The flood stream sets across the channel between Magazine island and Aplichau.

Directions.—By the western entrance keep in mid-channel. If using the passage between Magazine island and Aplichau, take care when the flood stream is running, to avoid being set on the eastern point of Magazine island. The eastern approach is not recommended for any vessel larger than a destroyer; it is only 130 yards across from the northeastern point of Aplichau to the nearest point of Hongkong island, and the course through is not straight, which makes the pass difficult for large vessels except at slack water. It is generally crowded with boats. There is plenty of water in the pass and the following directions are given should it be necessary to use it.

Proceeding up Thint shui wan, as Deep pass is approached, bear over to the eastward until the left extreme of the point under the police station at Shek pai bears 300°, when the high chimney of the dockyard will be in line with it, and the wooded summit, 289 feet, immediately westward of the dockyard, is over the point. Steer toward the point, edging northward till it bears 296°, and pass through the narrows with the point on this bearing (the extreme of the point is now in line with a solitary cocoanut palm on the steep slope immediately westward of the dockyard, but it is not conspicuous).

A hard spit runs off the northern side of the eastern of the two islets on the southern side of the passage for 70 yards from high-water mark to the 1 fathom contour. To clear this spit keep Deep pass point bearing 97°, astern, and when the islet is abeam steer through the middle of the harbor.

In using Deep pass ease the engines as much as possible to prevent damage being done to boats by the wash from the propellers.

The bays on the southwestern coast of Hongkong island westward of Aberdeen harbor are Waterfall bay, a mere bend in the coast of no importance; Taihowan or Pokfolum bay, which might be useful if telegraph cables were not landed in it; and Sandy bay, which is clear. These bays are not recommended, and Taihowan should especially be avoided as the cables are not laid on any defined line.

Sandy bay.—A shoal, small in extent and with a depth of 3 fathoms over it at low water, is situated in Sandy bay, at a distance of 800 yards, 250°, from the flagstaff southeastward of Hoichi wan.

Lamma island lies on the southwestern side of Hongkong island. The island is of irregular shape, about 4 miles long north and south, but narrowed near the middle, by Sokku wan on its eastern side and Hami wan on its western side, to $\frac{1}{4}$ mile across.

Lamma island consists of a succession of steep hills of barren appearance. It is cultivated where possible, but the population is scanty and very poor. From Pa kok or Boulder point, the northern point of the island, the eastern coast trends generally about 150° for $1\frac{6}{10}$ miles to Lukchau or George island, which is situated close to Lamma island, and is small, oval in shape, and rocky. Good anchorage is formed by the bend of the coast to the westward, commencing about 800 yards from Pa kok and continuing to the point off which Lukchau lies; it has good holding ground and excellent shelter from southerly winds. Lukchau wan, a snug little bay behind Lukchau, is a good anchorage, clear of shoals.

The channel between Lukchau and the point off which it lies is narrow and foul toward the island; heavy boats require caution in using it.

Sokku wan.—From Lukchau the coast turns into Sokku wan or Picnic bay, which runs in a southwesterly direction. The distance between the 10-fathoms contours on either side for $\frac{1}{2}$ mile from the entrance of the bay is 400 yards, after which it rapidly narrows; the center of the bay is clear and affords good shelter to vessels of moderate size. It is too narrow for long ships unless they are moored.

On the southern side of Sokku wan the hills rise very steeply to the highest part of the island, the summit of which is called Pok lu chau or mount Senhouse, and is 1,160 feet high.

Picnic bay (Sokku wan) is about 1 mile deep, with depths of 10 to $3\frac{1}{2}$ fathoms, but a cluster of rocks extends halfway across its head and 300 yards from the shore. George island, 215 feet high, lies close northward of the northern point of the cove.

The outer rock off the northwestern point of Lamma island is seldom visible, it dries 2 feet at low-water springs, and lies just over 200 yards off the point, and a rock, which is generally visible, dries 7 feet and lies 100 yards off the point. The southwestern point of Lamma island open of West point, bearing 162°, leads westward, and Magazine island open of Boulder point, bearing 83°, leads northward of the rocks.

Wong chu kok.—From Sokku wan the coast runs eastward, with several small bays in it, to Wong chu kok, the eastern point of the island, which rises to a hill, probably called Ngai tau, 482 feet high. Wong chu kok should not be approached within 400 yards by ships of deep draft, as a shoal with 4½ fathoms on it runs eastward off the point for 200 yards, and there is a slight tide rip at times outside it. From Wong chu kok the coast turns southward, and at 201°, 1$\frac{7}{10}$ miles from it is Un kok. Shek pai wan, a large bend running back for ¾ mile with a sand beach at its head, lies between them. This bay should be avoided; a swell continually runs in; there are many sunken rocks, and there is no landing except in the finest weather.

Unkok, the southeastern point of Lamma island, is the termination of a rocky, hilly promontory, and there is a depth of over 10 fathoms at a distance of 60 yards around it. The point rises suddenly to Unchau, a small round summit, 178 feet high, and conspicuous on northerly and southerly bearings. The promontory rises to a height of 370 feet.

Sam wan, a narrow bay on the western side of the promontory, runs in a northwesterly direction for over ¾ mile, and there is a sand beach at its head. It is clear of shoals in the middle, but it is not recommended, as the swell is almost continuous, and the landing, even at its head, is bad.

Tai kok, the western point of Sam wan, is high and rocky. The coast, high and rocky with two small indentations, runs westward from it for 1¼ miles and then turns northward for over ¼ mile to Hamitsui, a rounded sloping point.

Hami wan.—The coast from Hamitsui turns northeastward and northward, forming Hami wan, a fine large bay 2 miles in length, north and south, and ¾ mile deep, affording good anchorage for all vessels. It is well sheltered from easterly winds and the plan is a sufficient guide. The northern shore of Hami wan is a steep-sided promontory rising 385 feet above the sea, locally called Ching lum leng. Its western extremity, which is the north point of the bay, is called Wo lo tsui, and is composed of high rocks with no off-lying dangers, so that it may be safely closed. Lung shui wan, a smaller bay which can be used by small vessels, lies on the northern side of Ching lum leng. There are several villages and cultivated valleys in this locality.

Shek lok tsui, the northwestern point of Lamma island, rises steeply and there are several scattered rocks off it. From this point the coast trends about 79° for ¾ mile to Pa kok or Boulder point.

East Lamma channel, between Lamma island and Hongkong island, is about 1 mile wide, with general depths in it of 17 to 23 fathoms.

East Lamma channel—Measured distance.—The measured 2 miles has been extended another 3 miles to the northwestward, the western limit being marked by beacons erected on the northern side of Aberdeen harbor and on Magazine island, respectively.

The depths on the leading mark are from 12 to 20 fathoms.

Lamma patch.—A rocky patch of 8 and 9 fathoms, on which is a rock with a least depth of 32 feet over it, lies 32° 866 yards from Boulder point.

West Lamma channel, between Lamma and the islands lying eastward of Lantau, is about 3 mies wide, with general depths of 4 to 5 fathoms, mud. The deepest water, of not less than 32 feet except at lowest springs, is near the western and northern sides of Lamma island.

Tidal streams.—In the Lamma channels the stream runs northward while the water is rising at Kap sing mun and southward while it is falling there. As the time of tide at Kap sing mun is practically the same as at Hongkong, the Hongkong tide tables enable the mariner to determine the direction of the stream at any time. The rate of the streams seldom exceeds 2 knots. The depth in West Lamma channel being an important matter for ships of large draft, the tidal rise there can also be determined from the Hongkong tide tables. The datum of the chart is nearly the same as that of the tables.

Hongkong—Western entrance.—Green island, about ¼ mile in extent, 299 feet high and wooded, is situated ¼ mile northwestward of the northwestern end of Hongkong island. An islet 83 feet high lies about 100 yards eastward of it.

Green Island light.—A white and red intermittent light every 20 seconds, thus: Light, 17 seconds; eclipse, 3 seconds. It is elevated 110 feet above high water and visible from a distance of 16 miles. It shows the following sectors: White from the bearing 274°, through north and east, to 163°; red from 163°, through south, to 185°, and is obscured by the island from 185°, through west, to 274°.

It is exhibited from a white cylindrical tower 58 feet in height, with white dwellings adjacent, erected near the southwestern extreme of the island.

Sulphur channel, between Hongkong and Green island, though only 400 yards in width, is free from shoals. The least depth in the channel is 24 feet at lowest water off Belcher bay.

Kellett bank, with depths on it of 2¾ to 4 fathoms, extends northward about 1¾ miles from Green island and protects Hongkong harbor from the westward.

Wan chu chau (Stonecutters island), $2\frac{2}{10}$ miles northeastward of Green island, is nearly a mile long, east and west, ¼ mile wide, and 231 feet high. The eastern side of Stonecutters island is foul, and a ledge extends 200 yards southeastward from the northeastern point. A rock, which dries 3 feet at low water, lies 140 yards southward of White point, and a rock above water lies 200 yards northwestward of that point.

Landing on Stonecutters island is prohibited except to persons provided with passes.

Only vessels of less than 14 feet draft can pass eastward of the island.

Trocas rocks—Buoy.—A patch of rock with 3 fathoms over it lies 11° 600 yards from the eastern point of Stonecutters island and is marked by a white buoy on its southern side.

Stonecutters anchorage, between Kaulung peninsula and Stonecutters island, is much used during the typhoon season, all the large junks and many steam vessels taking refuge there on the storm signal being made.

Rock.—A rock with a depth of 1 fathom over it lies in the typhoon anchorage northeastward of Wan chu chau, or Stonecutters island, in a position from which the sheers at the Cosmopolitan dock bear 133°, distant 1,300 yards.

Directions—Western entrance.—A usual track is: From 1½ miles westward of Gap rock steer to pass 1½ miles southeastward of Hungkong chau, and thence 1½ miles eastward of Lingting island. Then steer northward into West Lamma channel, giving a fair berth to the 2 rocks northeastward of Lingting island. In West Lamma channel the deepest water is toward Lamma island. The best approach to the harbor for steam vessels of moderate draft is through Sulphur channel, which, however, should not be taken by sailing vessels, except with a fresh fair wind blowing right through.

In approaching this channel from the westward the channel will be open, and a vessel in the fairway when the islet eastward of Green island is nearly shut in by Green island, and as the channel is narrow it is well to avoid meeting vessels in it.

To proceed northward of Kellett bank from abreast Green island, keep mount Senhouse, the peak of Lamma island 1,160 feet high, open westward of Green island 168° until within half a mile of Chinghue; then steer northeastward and bring Kweiling or Devil's peak in line with White point, the southern point of Stonecutters island, 102°. Keep this mark on until the eastern end of Green island is in line with Shiktongtsui, the western point of Hongkong island, 175°, and then steer to the entrance of the Central fairway.

Sailing vessels generally approach Hongkong harbor from the westward, and either cross Kellett bank or pass northward of it, according to their draft.

HONGKONG AND CANTON SOUTHERN APPROACHES.

Kaipong islands, the southern group of the archipelago fronting the Chu kiang or Canton river estuary and Hongkong approaches, extend northeast and southwest about 10 miles.

Pak tsim, the northeastern and largest island, lies about south by west 16 miles from Lama island: the Ass's Ears, two high remarkable peaks near its western end, rise almost perpendicularly 940 feet, and falling suddenly on the northeastern side unite to the moderately high land (480 feet), which forms that part of the island.

Kwei tau (Tortoise head), a white rocky islet, lies about ¾ mile eastward of the eastern point of Pak tsim. There are other rocks between it and the point, and all the vicinity should be given a wide berth.

Gai une, an islet 130 feet high, is rather over 1 mile northward of the northern end of Pak tsim; the passage between is unsafe, for some rocks on which the sea sometimes breaks are said to exist in it.

Cambridge rock is a pinnacle with 17 feet water on it and on which the sea sometimes breaks, lying 50° 1 mile from Gai une. There are 4 to 5 fathoms on the rocks which surround the pinnacle. Caution is required when navigating in its vicinity.

Kwei tau, Pak tsim, and Cambridge rock bound the southwestern side of Tai ta mi channel.

Tsi mi wan, separated from the southwestern point of Pak tsim by a channel about ½ mile wide, is about 2 miles long, northeast and southwest, narrow, of very irregular shape, and 750 feet high.

A cluster of islets extends 4½ miles southwestward from Tsi mi wan.

Peaked rock, 160 feet high, the eastern islet of the cluster, lies 210° 1$\frac{2}{10}$ miles from the southern end of Tsi mi wan, the passage between being clear, with a least depth of 18 fathoms in it.

Rugged rock, 50 feet high, lies nearly 318° 2 miles from the southern end of Tsi mi wan.

Nut islet, 280 feet high, lies 261° 1$\frac{8}{10}$ miles from the southern end of Tsi mi wan: the passage, about ½ mile wide, between it and the islets southward of it, has 10 to 26 fathoms.

Jubilee islet lies 1¼ miles southwestward of Nut islet, another islet of the group being situated between, and Reef islet, 90 feet high and the southern of the cluster, lies ¾ mile southeastward of Jubilee islet.

The channel between Gap rock and Jubilee islet and Reef islet is about 1 mile wide, has depths of 10 to 18 fathoms, and is safely navigable with a steady wind.

Gap rock (Man mi chau), the southwestern of the Kaipong islands, is 97 feet high; several rocks extend for the distance of 200 yards around Gap rock, which should not be approached within ½ mile.

Light.—A tower on the eastern corner of the keeper's house on Gap rock, 62 feet high from ground to vane, exhibits, at 140 feet above high water, a revolving white light, every 30 seconds, showing thus: Light, 5 seconds; eclipse, 25 seconds; which should be seen from a distance of 18 miles.

The light-house and building are painted white.

Buoys for light-house purposes are moored northeastward and southeastward of the rock.

Fog signal.—A gun is fired every 10 minutes in thick weather.

Signal station.—There is a Lloyd's signal station on Gap rock, which is connected with the post-office and harbor master's office at Hongkong by telephone; vessels passing are reported.

Lema islands, 5 in number, extend east-northeast and west-southwest 12½ miles.

The islands on their southern sides are all steep and rocky, with not even a single bay that a boat could shelter in.

Nothwithstanding their barren appearance a few men reside on them, preparing small quantities of charcoal from brushwood found between the rocks, which is sold at Macao.

Tamkan, the eastern and largest of the Lema islands, is 6 miles long, 1 mile broad, 852 feet high at its western end, and separated from Ye chau by the narrow Yat mun.

Water may be obtained on the northern coast of Tamkan at several places; close westward of Northeast head, in Joss House bay, a little cove, is a Chinese place of worship, and about this part the compradores' boats await vessels after the end of August, when easterly winds set in.

Yat mun is clear and 12 to 19 fathoms deep, but this channel is not recommended and should not be taken by sailing vessels except from necessity.

In the northeast monsoon endeavor to pass between Tamkan and Putoi, which lies 6 miles northward.

Ye chau, the highest of the Lema islands, when viewed from most positions, appears flat-topped. Round island, a small rocky islet, lies close to its northeastern point.

This island is separated from Pun tin by Ye chau channel, which is about 800 yards wide, with 10 to 30 fathoms in it, but which is not recommended and which should not be taken by a sailing vessel except from necessity.

Pun tin island, 1,210 feet high, has a more peaked formation than the others, and Ichau head, its western projecting point, has a hummock on it.

Tai ta mi, a small but high islet, lies southward of Ichau head, with a channel ½ mile wide between it and Pun tin, and bounds the northeastern side of Tai ta mi channel.

Mosquito rock, 50 feet long east and west and 30 feet wide, with 13 feet over it, lies about 400 yards southward of the southern end of Tai ta mi islet. The southeastern extremities of Tamkan and Ye chau islands in line bearing 59° lead southeastward, and Ichau head and hummock well open of the western point of Tai ta mi islet leads westward of it.

Fishing junks—Caution.—Enormous fleets of fishing junks cruise in the approaches to Canton river and Hongkong; these junks show no lights; as a rule, they carry the smallest square sail forward; they are stoutly built, and serious damage would probably be caused to an iron vessel by a collision with one of them; they are sometimes found 40 miles offshore. This caution also applies to all the coast of China, but the large trading junks are differently rigged, having 5 masts with 2 small sails aft.

Ladrone islands.—Great Ladrone, or Man shan, being the outermost island directly fronting the Chu kiang estuary, is generally used as a landfall in sailing vessels bound either there or to Hongkong from the southward during the southwest monsoon. This island, with Little Ladrone westward of it and Potue 6 miles northwestward, bounds the eastern side of Great West channel, leading to the river.

The northwestern part of this steep, bold island forms a round dome, 1,468 feet high, and its appearance differs from all the other islands, although most of them are high. It is about 2 miles in diameter, and rocky. Pumice Stone bay is a small inlet at its southwestern end, where fishing boats shelter in the northeast monsoon.

Caution.—As few of the small islands lying outside Hongkong have been closely surveyed they should not be approached within 1 mile.

Little Ladrone (Poking han), lying westward of Great Ladrone, and separated by a narrow channel from 9 to 18 fathoms deep, which should not be used except in necessity, is 1,083 feet high, and of convex, sloping form.

A small rocky islet lies close to the northeastern point of Little Ladrone, and 1,400 yards northward of this islet is Black rock, which is covered at high water with 9 fathoms close around; to clear the rock when it is covered keep about midway between Little Ladrone and Tong ho island.

Potue (Passage island), 321° 4¾ miles from the north point of Little Ladrone, is a sloping rock visible about 9 miles. There are 5 to 6 fathoms around it, but it must not be approached in light winds by a sailing vessel, as the eddies occasioned by the stream out of the river might render her unmanageable and drift her toward it or Wong mu.

Wong mu island, lying 1½ miles east-northeastward of Potue, is 1 3/10 miles long, north and south, with a greatest width of 800 yards, and has a peaked hill on its northern part; nearly half a mile westward of its middle part are some rocks above water, and ½ mile northward of these are some sunken rocks.

Liungnib, 1,400 yards long and 600 yards wide, lying 1 mile eastward of Wong mu, has a round islet off its southern end. Nearly 1 mile 288° from the northern point of Liungnib are some rocks, which cover at springs and break in bad weather; and a rock, awash, lies nearly ½ mile westward of the same point; therefore do not close the northern end of this island within 1½ miles.

Tong ho island, 2¾ miles 12° from Little Ladrone, is 1 8/10 miles long, east and west, about 1 2/10 miles wide, and 885 feet high.

Boddam cove, on the northeastern side of Tong ho, is 266 yards wide, and about ½ mile deep, with 24 feet water at the entrance, 18 feet well inside, and the bottom all soft mud. On either side the land rises steeply and terminates in a valley at the head of the cove, where there is a sandy beach. The cove affords good shelter to small vessels at all times, for although open to the northeast monsoon, the seas break at the entrance, and the rocks offer facilities for securing vessels with warps; it is a rendezvous of fishing junks in bad weather. Here a vessel may anchor, or be run into the mud without risk.

Bouncer rocks, two in number and close together, lie 66⅔ yards northeastward of the southern entrance point; the outer rock is awash at low water.

Boddam cove is not readily distinguished until within about 2 miles of the northeastern part of Tong ho. Give a berth to North rock lying 400 yards off the northeastern point of the island, and bring the cove fairly open, bearing 236°; steer in on that bearing, keeping the summit of Round hill at the head of the cove just open of two high-water points on the southeastern shore to clear Bouncer rocks.

Supplies.—Water may be obtained, also beef, fish, poultry, and fruit.

Tides.—It is high water, full and change, in Boddam cove, at 9h. 40m.; springs rise 4½ feet. The flood stream sets northwest outside the entrance and the ebb stream southeast, pretty strongly, but the streams are very weak inside.

Pak leak island, or Putoi, about 2 miles across and 855 feet high, lies nearly 1½ miles, 30°, from Great Ladrone, and on its northeastern part is a remarkable conical hill. The hills on its southern side are covered by black rocks; on its eastern side and fronting Hoa ok islet is a cove where fishing junks shelter; on its northern side are some small bays in which water may be procured; and near its northeastern point is House islet, formed of rock, on which the fishermen have a hut and fishing stage.

A rock, awash, lies close off South head, the southern point of the island.

Clio rock lies about 400 yards from the western side of Pak leak, with the northwestern extreme of the island bearing 351°, distant 800 yards.

Chuk wan shan and Chuk chau islands lie 1½ to 3½ miles eastward of Pak leak. Chuk wan shan, the larger and eastern island, has a small bay on its northern side, and Sharp islet, high and rocky, lies off its southeastern point.

Raleigh rock, lying 11° $1\frac{7}{10}$ miles from House islet and nearly in mid-channel between Pak leak and White rocks, is a small pinnacle, with 7 to 9 fathoms close-to, and which breaks when there is a moderate sea at low-water springs.

White rocks, about 2¾ miles northeastward of Raleigh rock, are 2 high rocks ½ mile apart, with a third and smaller rock above water, rather westward of the mid-position between them. About 1 mile, 132°, of the southern rock is a rock awash at low-water springs, with 9 fathoms close around.

Channel—Caution.—The depth is about 9 fathoms in the channel between White rocks and Chuk wan islands, but this channel should not be used until it has been further examined.

Ai chau islands, 2 in number, lie $4\frac{3}{10}$ miles east-northeastward of Chuk wan shan, and the eastern and larger island is separated from the smaller by a very narrow channel with 4 fathoms in it.

Hill islet, lying 1½ miles northeastward of the eastern Ai chau, is surrounded by rocks, at a short distance from which is a depth of 11 fathoms.

Sa mun (Three gates), a group of 3 small islands, lies about 3½ miles eastward of Ai chau, and extends about 3 miles northwest and southeast, with narrow passages between the islands. Close northwestward of Hak chau, the northwestern island, are Peaked islets; and half a mile northeastward of the middle island is Gauze, a high rocky islet, with a reef of rocks lying between; the southern end of the eastern island, Hung kong chau, the highest part of the group, is a round hill, 492 feet high. A small bay on the southwestern side of the middle island affords shelter to 2 or 3 vessels during a northeast gale, with anchorage in 6 to 10 fathoms, mud.

Lingting island, 3 miles northeastward of the Sa mun group, is about 1¾ miles long, east and west, 1,400 yards wide, of a rugged appearance, and rises to a peak, 1,181 feet high, near its center. Needle rocks are 2 sunken pinnacles close together, lying about 300 yards southwestward of the low rocky northwestern point of Lingting; there is a depth of about 6 feet on them, and with a swell they are probably marked by breakers or ripplings.

Rocks.—A rock above water lies 13° 1,400 yards, and a rock awash 11° $1\frac{2}{10}$ miles from the eastern point of the island, with depths near them of 13 fathoms, but foul ground between.

Caution.—Give the northeastern side of Lingting a wide berth, especially at night.

Tai lo island, the southern of the range of small islands northward of Ladrone islands, is 590 feet high near its northwestern part, sloping a little eastward, and lies 5° from Liungnib, from which it is separated by a good channel 2¾ miles wide and clear, excepting the rocks off the northern point of the latter. Tai lok, about one-half mile northward of Tai lo, is a rocky islet 395 feet high, with a large rock on its summit.

Sam kok, or Pyramid island, lying 20° 1¼ miles from Tai lok, is 460 feet in height, rugged in appearance and pyramidical. On its northern side there is a small bay or cove for boats, and the island affords fresh water.

Between Sam kok and Tai lok is Sai lok, a small islet, and Ellis and Bird rocks, both above water; the channels between these are narrow and the eddies so strong as frequently to render vessels unmanageable, therefore they should not be attempted.

Chung chau si (West Water island), the northern of this range, lies about 32° 1¼ miles from Sam kok, and is 415 feet high. The depths are 4½ to 5½ fathoms about ½ mile westward of the islands from Tai lo to Chung chau si, and 5 to 7 fathoms off the eastern side.

The ebb stream sets strongly southward along the western side, and the flood in eddies northwestward.

Chuk tu aan (Phillpott island) lies about 70° 3 miles from Tai lo; a reef extends 400 yards from its northern side, and a detached reef, partly above water, lies about 400 yards northwestward of it.

Four-feet rock, a small pinnacle, with only 4 feet on it and 10 fathoms close around, lies 25° $1\frac{7}{10}$ miles from Chuk tu aan, and nearly midway between that island and the western end of Chung chau.

Chung chau (Water island), which with the islands southeastward of it bound the southwestern side of Lantau channel, lies 2½ miles southwestward of the southwestern point of Lantau; it is 1½ miles long northwest and southeast and 490 feet high, with a peaked hill near its northern point. There is a boat cove on the northern side of the island, and a short distance off its northwestern point is a high round islet with a large rock on its summit. There are strong eddies between Chung chau and Lantau.

Nau tau is small but high, and separated from Chang chau by a narrow channel 600 yards wide, named Nau tau mun, or Bullock head gate, in which there is shoal water close to Chung chau. The depths in the bay to the southward, which it forms with Lafsami, are 3 to 5 fathoms.

Lafsami island, close southward of Nau tau, is 785 feet high, and on some bearings appears as a peak. About ¾ mile eastward of its southern point is Rocky islet, on which are some fishermen's huts, and a winch for heaving up nets.

Lafsami is inhabited on its southwestern side, where fresh water may be obtained in a small bay.

Chi chau, 104° 3 miles from Lafsami, forms the southern side of the eastern entrance of Lantau channel. The island is 820 feet high, round in shape, inhabited on the western side, and separated by a narrow channel from Si chi chau, a smaller and lower island, on its western side. A sunken rock lies off its northeastern point, and a patch of 4 fathoms about ¼ mile off its northern point.

Between Si chi chau and Rocky islet is a safe channel 1½ miles wide, which may be used when bound for Canton river after entering from the southward between Chuk wan shan and Ai chau.

Soko islands.—A chau, the southern of the Soko islands, and nearly 4 miles southeastward of the southwestern point of Lantau, forms the northern side of the eastern entrance of Lantau channel. A chau rises very steeply to the height of 525 feet.

Water may be procured at a little sandy beach on the northern side of A chau.

North Soko island, lying nearly ½ mile northward of A chau, is about 1 mile long, east and west, and very narrow in the middle.

A sand spit extends westward upward of 1½ miles from its western side.

A rocky islet and two rocks above water lie between the Soko islands; also, High rocky islet is ¾ mile southeastward of A chau, but the ground is foul between.

Lantau (Tai ho island), lying westward of Hongkong, is 15 miles long, northeast and southwest, and its greatest breadth 5½ miles. The island is high, and about its center are peaks, the highest of which rises 3,050 feet above the sea.

Close to the western coast of Lantau, and 1¼ miles from the southern point, is Peaked hill, which is insulated at high water.

A rock above water lies about 346° 1 mile from Peaked hill and ½ mile from the land. At 1½ miles northeastward of this rock is Bluff point, and southeastward of the latter a bay, in which is Tai ho village, where there is a creek into which a boat can go at high tide.

Southward of the village are two bays, both of which are shoal, but fresh water may be procured in them.

On the northern side of Lantau, and nearly 3 miles northeastward of Bluff point, are two projecting points half a mile apart, between which is Pa lo wang bay and village, and northward of the eastern point of the bay, and about ¼ mile distant is a small islet 138 feet high, having a rock awash off its northwestern side, and a rock 4 feet high about 300 yards southward of it. Eastward of the islet is Tung chung bay, which is shoal and has Tung chung village at its head.

Chu lu kok, an island about 2 miles north and south, of irregular shape, and 400 feet in height, lies northward of Tung chung bay. Red point, its northeastern extreme, has a remarkable rocky appearance, and is frequented by stone cutters, who cut the granite into slabs for building. East-northeastward of Red point at 1¼ miles is West Brother, and at 2¼ miles East Brother (Motoe islets), 212 and 193 feet in height. Reef islet, 30 feet high, lies 195° ½ mile from East Brother.

Saw chau, lying 3 miles northwestward of Red point, is 198 feet high, and nearly 1 mile long; there is a sharp hillock at its northern end. Tree islet, 30 feet high, lies about 285° 1,400 yards from the northern part of Saw chau, and White rock, 7 feet high, lies about 310° 800 yards from the islet.

Tong ku, about 1 mile northward of Saw chau, is 267 feet high and rocky in appearance.

Southward of Lantau peak (3,064 feet) there is on the coast a high and rounded point of about 500 to 600 feet in height, and to the eastward of this is a broad bay with general depths of 3 to 4 fathoms.

The eastern side of the bay is formed by a rugged peninsula which rises to a jagged summit 996 feet in height and forms the southeast point of Lantau.

Villages of a fair size are situated in both the eastern and western corners of the bay.

Rocky islet, situated 1,600 yards to the eastward of the western point of the bay, is 95 feet in height.

Mid rocks, 1 mile 56° from Rocky islet, are a group of small wedge-shaped rocks which dry about 4 feet and have a depth of 3½ to 4 fathoms close around them.

Shaku chau (Patung island) lies to the southward of the peninsula forming the eastern side of the above-mentioned bay, and is separated from it by a channel 1,200 yards wide, with depths of 6 to 7 fathoms in it. The island is 1,700 yards long and of varying width, with two summits, of which the northwestern one (609 feet) is the highest, and is surmounted by large bowlders. The southeastern summit is 511 feet high. On the northwestern side of the island and extending 350 yards from its shore is a ledge of rocks 7 feet in height.

Between them and the shore of the island is a channel about 108 yards wide, with depths of 2 to 3 fathoms in it.

Chung island, which is $1\frac{8}{10}$ miles in length, has its northern and southern ends joined together by a narrow neck of sand, less than 200 yards wide, on which a populous and thriving fishing village is situated.

The northern summit is 550 feet high, and the southern 250 feet.

The bay on the western side of the narrow neck appears to offer good shelter, but as it is generally full of junks there is little room for a small vessel to lie unless secured beside them.

The northern end of the island is separated from the southeast point of Lantau by a channel 1,100 yards wide with depths of 3 to 4½ fathoms in it.

Beacon light.—Near the center of the above channel is a solitary rock which dries 3½ feet at low water. An iron staff beacon with small cage has been placed on this rock, and a small fixed red light is shown from it at night.

Chung rock, which dries 5 feet at low water, lies 600 yards eastward of the eastern point of Chung island. A head, with 1¾ fathoms over it, lies 66 yards to the westward of this rock.

Lantau, east coast.—From the southeastern point of Lantau the coast trends generally to the northward, with bays of about 1 mile in depth. The first of these runs in toward the narrow neck which forms the peninsula of the southeastern point; it is shallow and affords but little shelter.

Silver Mine bay.—Adjoining this bay is Silver Mine bay, known previously as Moiwo and now as Ngang kong, and which takes its name from a small mine, now disused, situated on a hill at the back of the cultivated ground at the head of the bay. On the northern side of the head of this bay, and a little way up the hill, is a conspicuous tall chimney.

At the head of the bay the ground is well cultivated, and 3 fair-sized villages stand at the back of the fields.

The best landing is on the southern side of the head, where a small stream flows into the bay.

Dangers.—A rock, awash at low water, lies 466 yards from the head of the bay and 333 yards from the northern shore; it has 2 fathoms around it, and should be avoided by small craft anchoring in that vicinity.

A rock, which dries 6 feet, lies 300 yards 228° from the northern entrance point of Silver Mine bay; it is steep-to with depths of 3¾ to 4 fathoms around it.

Northward of Silver Mine bay the coast runs to the northward for about 2 miles, and then turns to the northeastward for about the same distance to the northeast point of the island, forming in the latter part 2 bays.

The first of these is nearly 1 mile in width and has 2 small islets in its entrance, and between them and the southern shore is a rock, which dries 6 feet at low water. There is only about 2 fathoms of water in this bay, but otherwise it appears free from dangers for small craft.

The second bay is about ¾ mile in depth and ⅓ mile wide; it runs in a north-northwest direction, has 3½ fathoms in its entrance, and shoals up gradually to its head.

Papai (Taiku chau) lies off the entrance to Silver Mine bay; it is 1$\frac{4}{10}$ miles long, about ⅔ mile wide, and rises to a height of 598 feet near its center. To the westward of its southern summit (396 feet) and 350 yards from the shore are 3 conspicuous pinnacle rocks, the highest 18 feet above high water.

Chau kung is to the northeastward of Papai and separated from it by a narrow strait 300 yards wide. It is rather more than ½ mile long, northeast and southwest, ⅓ mile wide, and rises to a height of 354 feet near its northeastern end.

Peang chau rises on its northern side to 149 feet and on its southern side to 321 feet; these 2 parts are connected by a low sandy neck at their western ends, forming a bay facing to the eastward. On this sandy neck is a fair-sized village, with lime works at its northern end.

Tai pak island is close to the westward of the northern end of Peang chau. It is just over 200 yards in extent and is 65 feet high. Off its southwestern and southern sides are 2 conspicuous rocks, 15 feet and 21 feet high, respectively.

Rocks.—A pinnacle rock, known as Douglas rock, with only 3 feet over it, lies with the northern point of Kau i chau bearing 110°, distant 1,200 yards, approximately.

Comber rock is near the middle of the channel between Tai pak and Lantau. It dries 3½ feet, and from it the west extreme of Tai pak bears 123°, distant 500 yards.

A small iron staff with cage was placed on this rock by H. B. M. S. *Rambler.*

A rock, with a depth of 5 feet over it at low-water springs, lies 300 yards off the Lantau shore, at a distance of 1,400 yards 187° from Comber rock.

Chung hue island lies 1½ miles to the eastward of the northeast of Lantau, the channel which separates them being known as the Kap sing mun, and between the island and the main is Rambler channel.

The island is hilly and rises at its southern and highest end to a height of 1,091 feet, the northern end being about 700 feet high, a neck of land, a little over 300 feet in height, dividing the two ridges.

In proceeding through Kap sing mun by the northeastern channel from the westward keep close to the mainland to clear the reef extending $\frac{1}{3}$ mile eastward of Ma wan; then pass in mid-channel between that island and Chung hue island, which lies 1 mile eastward, and if bound for Hongkong, round the southwestern end of Chung hue and steer for the western end of Won chu chau or Stonecutters island.

Rambler channel, which varies in width from 300 yards at its northern end to $1\frac{9}{10}$ miles at its southern end, is clear, but is not recommended except for small craft, as the tides, especially the ebb stream, set strongly through it, and it is much frequented by junks.

The southeastern entrance point of the channel lies 1,450 yards to the northward of the northern point of Stonecutters island. From this point the land trends to the northwestward into Gin Drinkers bay, which is 1,500 yards wide at the entrance and runs back about the same distance. At 100 yards from the southern point of the bay and connected with it by a drying reef is a small islet 92 feet high. Pillar island, which is 159 feet high and 400 yards in length, lies off the center of the bay. An isolated rock, 4 feet high, lies 100 yards from the southwestern side of Pillar island, the outer side of which is steep-to. The bay is shallow, drying out for nearly 600 yards at its head, where a small stream flows in, on the south side of which is a village, above which the ground rises steeply to Golden hill.

Northward of Gin Drinkers bay the coast trends to the northwestward, then turns to the northeastward into the bay known as Chin wan.

Channel rocks are a group of rocks about 150 yards in extent, lying at the northern end of a patch of shoal and foul ground extending 400 yards in a northwest by north and southeast by south direction, with a width of 200 yards. These rocks are covered at high water, and the highest of them, which dries 7 feet at low water, lies 1,350 yards 332° from the summit of Pillar island. The rocks are nearly steep-to on their western side, and may be passed on that side at a distance of from 80 to 100 yards.

Cap island lies off the northeastern corner of Chung hue island. It is 550 yards long, 300 yards wide, and the summit is 106 feet high. Between it and Chung hue is a shallow junk harbor called Mun tsai tong, which in bad weather is packed with junks. About 600 yards southward of this is a small bay called Changi, which is also used as a shelter. Off its entrance is a group of rocks which dry 7 feet, with shoal water around.

Chen wan.—Between Chung hue and the mainland to the northward the channel is about 600 to 800 yards wide, but to the northeastward of Chung hue it opens to a width of ¾ mile, forming Chen wan, at the eastern end of which is Chen wan village.

There is good anchorage in this bay in 6 to 8 fathoms, mud bottom, to the northward of Cap island; and in the southeast part of the bay is probably one of the best anchorages for small craft on the coast of China, in a depth of 2 to 4 fathoms; it is, however, difficult of access for that reason, as it is crowded with junks in any bad weather or on the first approach of a typhoon.

In this latter anchorage there is very little tidal stream, but in the center of the bay the ebb runs to the eastward and southeastward at 2½ knots at springs; the flood, however, is a good deal weaker, and at times disappears altogether.

Two small streams flow into the bay, one through the village of Chen wan, and the other on the north side of the bay. On the latter stream are several mills for pounding camphor-wood chips into powder for the manufacture of joss sticks. In the northeast corner of the bay is a fairly large samshu factory.

Tai mo shan.—The ground to the northward of Chen wan village rises steeply, and at 2¼ miles in that direction is Tai mo shan, 3,143 feet in height, and the highest point in this vicinity.

The channel west of Chen wan runs a little to the southward of west, with the land sloping steeply to the water on both sides. It is free from dangers, and the coast of the mainland may be approached within 100 yards. On the Chung hue side the coast falls back a little, forming a shallow bay, and there the shoal water extends 266⅔ yards from the shore in places.

Pak sha kiu, a hill 1,553 feet high and surmounted by a few large bowlders, rises from the north shore of the channel.

Tingkao village is situated in a sandy bay on the mainland abreast the northwest point of Chung hue island. The 5-fathom contour line here extends for about 700 yards to the southeastward, and to the southwestward from this is a bank of shoaler water, about 400 yards in extent, with a least depth of 3 fathoms. Between this latter shoal and the northwest point of Chung hue is a passage of over 200 yards in width and with deep water.

Kap sing mun or Kap shui mun (lit. strong water passage) or Throat Gates, between the eastern end of Lantau and Chung hue island, is divided into a broad channel to the eastward and a narrow one to the westward, by Ma wan island, on the south side of which is Kap sing islet.

The western channel is that almost invariably used by vessels, as it is shorter in distance, and as the tide in the eastern channel runs with nearly equal velocity on the northern side of Ma wan there is little to be gained by taking the longer but wider route.

Bunsansiah rock (Passage rock) in the southern entrance of the Kap sing mun with the south point of Chung hue bearing 78° 1$\frac{4}{10}$ miles is a pinnacle, awash at low water, with depths of 6 to 10 fathoms close around.

There are 3 small bays on the western side of Chung hue with shoal water on them; the points, however, are steep-to and may be passed at 200 yards' distance.

Ma wan island.—The east coast of this island is formed of sandy beaches and rocky points, with shoal and foul ground extending off it for a distance of 400 or 600 yards. A shoal with a least depth of 4½ fathoms, and 8 and 9 fathoms around, lies 500 yards 97° from the southeastern point of the island.

A spit of foul and rocky ground extends to the eastward for 250 yards from the northeast point of Ma wan. At the end of this spit is a cluster of rocks which dry 6 to 7 feet at low water. Boats and small craft should not approach the spit too closely when rounding the point on the ebb tide, as the ebb stream sets strongly over it.

The north coast of Ma wan is more or less steep-to; there is a sandy bay in the eastern half of it, off the western point of which the 3-fathom contour line extends for about 100 yards.

From the northwest point to the west point of Ma wan is a distance of 800 yards, with an open bay between. The southern summit of the island is 213 feet and the northern 166 feet high.

Just south of the west point is a small bay, with a small stone pier and fishing village in it; from this the coast trends southeastward to the south point of the island and is steep-to.

Light.—A fixed red light, elevated 50 feet above high water and visible from a distance of 6 miles, is exhibited from a white mast standing on the western point of Ma wan island. There is a white hut at the foot of the mast.

Kap sing islet, about 300 yards long, 200 yards wide, and 102 feet in height, lies 240 yards from the south end of Ma wan, the channel between being shoal and foul.

The western channel of the Kap sing mun, between Ma wan and Lantau, is 380 yards wide at its narrowest point and 280 yards between the 5-fathom contour lines. Both shores are fairly steep-to, the Ma wan shore being rather more so than the other.

The coast of Lantau bordering the Kap sing mun is indented and trends in a general north-northwest direction to a small bay abreast the fishing village on Ma wan, whence it trends more to the westward to the north point of the island. From this point the coast turns to the southwest with a shallow bay which is divided into two by a very narrow point. At 2 miles from the north point the coast turns sharply to the northward again, forming a bay ¾ mile in length, but with only shallow water in it, except at its entrance. At ½ mile from the head of this bay is a double point, off the eastern side of which is a small grassy island, 84 feet in height. This island is connected with the point at low water.

The mainland coast from Tingkao village, just west of which is a rather conspicuous low hill 138 feet high, with cultivation on the top of it, the coast turns to the west-southwestward for ½ mile to a rounded, steep, and rocky point. From this point it turns to the northwestward to a sandy bay with a little flat ground at the back, on which are 2 villages and cultivation. Shoal water extends for about 300 yards off the shore here, caused probably by a small stream that flows into the center of the bay. From this bay the coast again trends to the west-southwestward for ½ mile to another sandy bay very similar to the last; here shoal water extends for 200 yards offshore.

From this latter bay the coast is bold and steep-to, and trends gradually from west-southwest to west-northwest, for a distance of 1½ miles, to Brothers point. The hills above this part of the coast are very barren and forbidding looking, and are covered with large bowlders. Beyond Brothers point the coast turns sharply to the northward for 300 yards to a sandy bay into which flows a small stream and various rivulets. Beyond the beach the ground runs back flat for nearly ½ mile, at first with sand flats, and beyond with cultivated land and villages, the hills falling steeply to the plain on each side. Just to the westward of the bay is Coxcomb hill, 171 feet high, which slopes, with three crests, to the western point of the bay.

Tides.—The times of high and low water in Kap sing mun and Rambler channel vary considerably when compared with the times of high and low water at Hongkong dockyard, but the mean results are as follows:

At Cap island, northeast point of Chung hue island, the tide is 40m. later than at Hongkong dockyard, and at a point on the southwest coast of Lantau, abreast of East Brother island, it is 1h. 12m. later than at Hongkong.

In the small bay just south of the west point of Ma wan island the times of high and low water were found to vary considerably as compared with Cap island, the difference in two days varying from 30m. before to 1h. 5m. after the times at Cap island.

As regards the range of tide in the Kap sing mun, there is but little difference as compared with the range at Hongkong dockyard.

Tidal streams.—The tidal streams in the vicinity of the Kap sing mun are strong and at the sides of the channels cause whirls and eddies sufficient to make a boat or small craft unmanageable.

The ebb stream flows to the eastward, parallel to the land past the Motu islands, increasing in speed as the channel narrows at the north point of Lantau, where it runs with a velocity of over 3½ knots at springs.

The northern portion of this stream flows on between the north coast of Ma wan and the mainland, and here it attains a greater velocity, a speed here of 4¾ knots having been obtained just north of the northeast point of Ma wan. The stream then divides at the northwest point of Chung hue, one part going northward of that island and turning to the southeastward and southward through the Rambler channel with a velocity at springs of about 2¼ knots; the other part turns to the southeastward and southward and flows through the broad channel westward of Chung hue, and reduces in speed as it spreads out from 3½ to 2¼ knots. The latter stream is marked by tide rips, which move through the channel and are generally to be found at no great distance from the Chung hue shore. At times during the ebb still water and, occasionally, a counter current to the northward may be found along the east side of Ma wan.

The southern portion of the stream, after passing the north point of Lantau, strikes at and to the westward of the west point of Ma wan and is then deflected to the southward through the narrow channel to the westward of that island. In the bay between the northern and western points of Ma wan the stream runs in all directions, part to the northward and part recurving to the southward in whirls. Just to the northwest of the west point it sets strongly toward that point and into the little bay just southward of it; further along it sets generally straight through the channel, the greatest speed recorded being a little over 4 knots.

The flood stream in the Rambler channel is weak and at times nonexistent. That through the channel between Chung hue and Ma wan is also weak, compared with the ebb, running with a velocity of only 1¼ knots in the center of the channel, and of 2¾ knots to the north-northwestward past the spit off the northeast point of Ma wan. The main stream of the flood probably runs to the westward until it strikes the east coast of Lantau and is there deflected through the small channel between Ma wan and Lantau, where it attains a considerable velocity, as much as 5¼ knots having been registered. It meets the weaker current flowing to the westward at a line joining the north point of Lantau and the northwest point of Ma wan, but is only slightly deflected by it, and flows across in a north-northwest and northwest direction until it strikes the coast of the mainland. Here it turns to the westward and runs along parallel to the shore, the current in the southern part of the channel being but slight.

The coast of the mainland westward of Kap sing mun is high and almost steep-to as far as Brothers point, at about 2 miles westward of Ma wan; thence to Pillar point, 4½ miles farther west, there are some creeks and Castle peak bay, which is shallow. A 3-fathoms patch lies 102° 1$\frac{6}{10}$ miles from Pillar point. From Pillar point to a point 1¾ miles westward the coast is steep at a distance of 400 yards; thence to Black point, the northwestern point of Chung saw wan, or Castle peak promontory, shoal water extends over ½ mile off the land.

Urmston road (Tong ku harbor), between Tong ku and Saw chau on the west and the coast of Chung saw wan on the east, is a safe and tolerably sheltered anchorage. Steam vessels bound to Canton anchor here and off Castle peak bay at night. The best berth is in about 9 fathoms with Tong ku peak just open southward of Lintin and nearer the mainland than Tong ku, where smooth water has been found during an easterly gale. The tidal streams are strong. Fresh water can be procured in abundance.

Hau hoi wan, or Deep bay, has its entrance between Black point and Southwest point of Nam tau, about 4 miles northward, and it extends northeastward 9 miles. The bay is shallow, with a narrow 19-foot channel leading 5 miles into it.

Nam tau, a headland 3 miles long, northeast and southwest, 1¾ miles wide, and 1,100 feet high, juts out from the main, with which it is connected by lower land. The southwestern coast of Nam tau outside the line of the points is fairly steep-to.

Ma chau, 280° 1½ miles from the northwestern point of Nam tau, forms 2 connected islets, the southeastern being 152 feet and the northwestern 220 feet high. On the northwestern side of Ma chau island is a settlement, the lights of which form a good mark at night; being close together, they are easily distinguished from the numerous lights of the junks. A spit, with 10 to 13 feet water on it, extends 1 mile southward of the southern end of the islets.

The channel between Ma chau and the spit southward of it on the from which it is separated by a channel about 800 yards broad, with with a least depth of 19 feet.

Tai shan, an island 375 feet high, lies northeastward of Ma chau, from which it is separated by a channel about 800 yards broad, with a depth of 5½ to 8 fathoms in its fairway.

Syah islet, 83 feet high, lies northwestward about 2 miles from Tai shan.

Fishing stakes are placed in the channel at about 1½ miles northwestward of Syah islet, and 3 fixed white lights are exhibited from them at night.

Lintin island, lying 292° 3 miles from Tong ku, is about 6 miles around, and it rises to a conical peak 1,110 feet high. A rock awash at high water lies about 400 yards off the middle of its northeastern side. South Sand spit, with depths of 1 to 3 fathoms, extends 4½ miles southward of the island, and is tolerably steep-to on its western side, with 6½ to 11 fathoms near it.

There is anchorage off Lintin at about 1½ miles from the sandy beach on its southwestern side in 10 or 12 fathoms; from the depth of 10 fathoms the water shoals quickly toward the island.

Fresh water can be obtained at the eastern end of the beach on the southern side of Lintin; and occasionally a few bullocks and some vegetables may be procured from the inhabitants.

Caution.—It has been reported that the channels north-northwestward of Lintin island are much changed since the survey was made; extreme caution is therefore necessary.

Lintin bar.—A sand bank, the southern part of which is named North Sand spit, extends north-northwestward 13½ miles from Lintin, and a narrow ridge, with a least depth of 11 feet on its northern part, is named Lintin bar.

The northern end of this sand bank was situated 327° 10½ miles from Fan si ak, but it is reported to have extended northward.

Tides and tidal streams.—It is high water, full and change, at Lintin island at 0h. 0m.; springs rise 7½ feet. The streams run nearly north and south, and the rate of the ebb in the freshets is sometimes 5½ to 6 knots an hour. From October to March the neaps are very irregular, sometimes only one tide being perceptible during 24 hours.

Fan si ak, 25 feet high, lying about 4 miles northward of Lintin, and White rock, 15 feet high, about ¼ mile farther northwestward, are 2 rocky islets, the larger of which is Fan si ak. Fan si ak channel, over the sand bank northwestward of Fan si ak, is reported to have shoaled.

Tides and tidal streams.—In Fan si ak channel it is high water, full and change, at 1h. 0m.; springs rise 6 to 8½ feet, neaps 2½ to 3 feet, but the rise is irregular especially at neaps; the rate of the tidal stream is 3 to 4 knots at springs and 2 to 2½ knots at neaps.

Lankit flat, extending from the northern end of Lintin bar across the channel to the shoal mud bank on the western side, and northwestward toward Lankit island, consists of sand and mud, with hard bottom in some places; a vessel, therefore, drawing more than 20 feet should not pass over it until about half flood.

There are usually some fishing stakes, with boats made fast to them, close northward of this flat, and others between Lintin and Lankit; care must be taken not to run over the boats, which generally show lights at night.

Macao harbor.—Macao, a Portuguese settlement in China, stands on a small peninsula projecting from the southeastern end of the island of the same name. The peninsula is nearly 2 miles long, less than 1 mile wide at its broadest part, and is connected with the island by a low, narrow, sandy isthmus, across which extends a barrier wall to exclude foreigners from the interior of the island. The town is built on the slope of the hills, which are 200 to 300 feet in height. The population was 78,627 in 1896.

There is open anchorage in the roadstead eastward of the peninsula. Vessels of heavy draft lie about 9 miles off, and opium is taken to them in junks.

The harbor is formed between the peninsula and Tui lien shan, or Patera island, to the westward. The entrance is narrow, and it is accessible to vessels of 10 feet draft. The bottom is soft mud.

There is an excellent landing pier, and daily communication is maintained with Hongkong and Canton.

Light.—A white octagonal tower 45 feet high, at fort Guia, on the southeastern side of Macao peninsula, exhibits at 332 feet above high water a revolving white light, the period of revolution being 1 minute, which should be seen from a distance of 20 miles. Within a distance of 12 miles a faint light is visible, during the period of the eclipses at greater distances.

Lady Franklin rock, with 13 feet over it at low water, lies 1,600 yards 63° from Cabrita point, the northeastern point of Taipa island.

Pedra Arèca, a rock which uncovers at low water, lies 800 yards southeastward of the southern point of Macao peninsula and is marked by a red buoy.

Directions.—For the inner harbor, approach with Guia lighthouse bearing 270° until Cabrita point bears 180°, then steer 234° until fort D. Maria extreme bears 0°, whence pass midway between pedra Arèca and the southern point of Macao peninsula, around fort Barra at about 200 yards, and moor in midchannel northwestward of it, where the least water is 17 feet at low-water springs. Attention is necessary to the tidal streams, which set strongly around fort Barra point. A shoal extends 100 yards southwestward of fort Barra point, and the water on the western side of the harbor entrance has shoaled.

Tides.—It is high water full and change, at Macao, at 10h. 0m.; springs rise from 6½ to 15 feet, neaps 6 feet.

Trade and shipping.—The principal articles of export are opium, cotton goods, flour, silk, tea, matches, and oil; and of import, fans, firewood, mats, silk, sugar, and tea. The shipping at the port is mostly confined to junks, and in 1896, 16,109 junks entered and cleared with a total tonnage of 900,032 tons.

Climate.—Macao being open to the southwest monsoon is more agreeable and salubrious during the hot season than Hongkong, and although by no means exempt from the diseases prevalent in that colony, yet sanitary improvements have much increased the healthfulness of the town.

The mean temperature for the year is 74° F.; for February, 60°; for July 84°; and the annual rainfall is 69 inches.

Supplies.—No coal, patent fuel, or liquid fuel is obtainable.

Kau chau (Nine islands), a group of islets situated northeastward about 4 miles from Macao, lie close together, and the depth is 3 fathoms at about ½ mile eastward of the outermost islet; a rock, always above water, lies about ¼ mile southward of the southern islet of the group.

There is anchorage in from 5 to 6 fathoms westward of this group, with some shelter from the northeast monsoon.

The rock above water is a good mark for the anchorage. The wreck of a steam vessel lay westward 600 yards from the rock and part of the boiler showed like a buoy at high water, but it may now have disappeared.

Kum sing mun harbor.—From Macao the eastern coast of Macao island trends north-northeastward about 11 miles to Bluff head, where it turns abruptly westward and forms Kum sing mun (Golden sun-born pass) harbor, which is safe for small vessels. The depth is only 2 to 3 fathoms at 2 miles outside the entrance, but it increases quickly to 7 and 8 fathoms within ½ mile of Bluff head.

The entrance, about ½ mile wide, is between Ki au island and Bluff head. Between this head and a small islet and sunken rocks near the island the depth varies from 14 to 6 fathoms. Anchorage may be obtained at about 1,200 to 1,600 yards westward of the islet in 6 to 4 fathoms, soft bottom, avoiding the shoal patches shown on the plan.

Tides.—It is high water, full and change, in Kum sing mun harbor at 0h. 6m.; springs rise 6½ feet, neaps 5½ feet.

CANTON RIVER (CHU KIANG) APPROACH—DIRECTIONS.

Lema channel, between Lema islands on the south and Pu toi group on the north, is about 6 miles wide; it should, if possible, be always adopted in sailing vessels bound to Hongkong or Canton river in the northeast monsoon, and therefore Northeast head of Tamkan island should be made on a westerly bearing. In thick weather, when the land can not be discerned above 3 or 4 miles, with strong east to southeasterly winds, it may be prudent to lay-to outside the channel; do not then shoal the water to less than 26 fathoms, as in this depth a ship will drift seaward of all the islands.

Taitam bay, Tathong channel, and East Lamma channel afford shelter in a typhoon if an anchorage is gained before night.

From about 1 mile southward of Pu toi, the entrance of Lantau channel bears 270°, distant 19 miles, and the direct course leads southward of Lamma and northward of Lingting islands. The channel between Lingting and the Samun group is 2½ miles wide and clear, but that northward of Lingting is preferable, and a vessel may work from side to side. Give a wide berth to the rocks northeastward of Lingting and to Needle rocks off its northwestern point.

Tidal streams.—During southwesterly winds it is sometimes difficult to turn through Lema channel from the eastward, as there is generally an easterly set, the ebb stream out of the numerous channels setting eastward and the flood northeastward; with strong southwesterly winds the rate of the stream is about 1½ knots an hour.

Lantau channel, between Soko islands and the southwestern end of Lantau on the north, and Chi chau, Lafsami, and Chung chau on the south, is nearly 2 miles wide and clear, with a general 300° and 120° direction.

The water is shoal northeastward of a line joining the southwestern points of Lantau and A chau.

For Macao, round Chung chau, at the distance of about 1 mile, and steer direct. For the Canton river, from about 1¾ miles westward of Peaked hill, Lantau, steer for about 1 mile westward of the western Point of Lintin, the ship's position being frequently ascertained by bearings.

The tidal streams must be considered; keep a good lookout for fishing stakes.

Tidal streams.—The ebb runs throug Lantau channel in strong eddies, particularly in July and August, when its rate is sometimes 4½ knots an hour at springs. With a light wind at times it is difficult to manage a sailing vessel here.

The ebb stream eastward of Lintin sets southward, but westward of it southeastward.

Tai ta mi channel.—Proceeding through Tai ta mi channel, between Lema and Kaipong islands, pass well northeastward of Cambridge rock and steer for Lingting; pass between it and the Sa mun group and then through Lantau channel; or pass betwen the Sa mun group and Ai chau and thence through Lantau channel.

Great West channel, westward of the Ladrone islands, is generally used when bound to Canton during the strength of the southwest monsoon, or from about June to August, inclusive.

Late in the season, when the winds have easting in them, or at any time with northerly or easterly winds, as there is a risk of being driven westward by the freshets setting out of the Great West channel, in a sailing vessel proceed by Lema and Lantau channels. Typhoons generally commence in a moderate gale from the northward, which is a leading wind for these channels, and as the wind commonly veers eastward before it blows hard, a vessel with the first of the gale may get up the river above Lintin, where these storms are less violent than outside among the islands.

Canton river (Chu kiang) approach.—The channels among the islands in the approach to Canton river (Chu kiang) estuary being generally clear, do not hesitate to go through the nearest convenient channel without a pilot if the weather is not thick. The streams must be attended to, as they set in varying directions among the islands lying southeastward, according to the prevailing winds, a strong easterly wind generally producing a westerly current, which the ebb tidal stream reduces in strength.

A pilot, can one be obtained, may be useful to run the vessel into a place of shelter in case of bad weather. Macao road should not then be used, but the vessel should proceed up the river well above Lintin.

If making the land in thick weather, it may be noted that the Kaipong and Lema islands, excepting Tam kam, which is long and of an undulating form, are detached, high, and uneven, with soundings of 19 to 24 fathoms close to, whereas the islands between Great Ladrone and St. John to the westward are large and of regular appearance, resembling a coast more than islands, with depths of only 10 and 11 fathoms at a considerable distance outside them.

The freshets out of Chu kiang set almost constantly from the southern end of Wung kum, along the coast of the islands to the westward, at the rate of 1 to 2 knots an hour, particularly with strong easterly winds, and although at times there seems to be a surface stream setting eastward, or into the entrance of the river, the freshets underneath continue to run westward, by which sailing vessels are rendered unmanageable, even in fresh winds. Many vessels from this cause, after getting near Wung kum, or between it and Potue island, have drifted nearly to St. John island whilst endeavoring with moderate winds to keep eastward.

Steering, therefore, for the Great West channel, to avoid being drifted westward, never borrow near San chau or the other islands to the westward unless it is blowing hard from the southwest.

The freshets abate at times, and then weak tidal streams set eastward, but as these are not of long duration, keep on the eastern side of the channel toward the Ladrone islands and Potue, and anchor at once if drifting westward.

In the strength of the southwest monsoon, if the wind be steady between southeast and southwest, make Great Ladrone bearing about north, and avoid the islands to the westward; this is especially necessary after the middle of August, when easterly winds prevail for several days together, as they do more or less at all seasons. On falling to leeward about St. John in September or October, a tedious passage is generally made to Macao by keeping close along the islands, where the currents or freshets setting westward oblige frequent anchoring, but the best plan, as these freshets prevail only in shoal water near the islands, is to stand well off the land and take advantage of favorable shifts of wind to get eastward.

Having passed through Great West channel, or from Macao road, with a leading wind and the ebb, haul over northward of Lintin, for the tidal stream will then be upon the port bow, and keep the vessel off the western shore; whereas, with an easterly wind, the tendency of the flood stream is to drift the vessel into shoal water off that shore.

Tidal streams.—In Macao road and between it and Lintin, the streams are frequently irregular, setting in a different direction at the surface to what they do underneath, by which vessels are rendered unmanageable in light winds. The ebb is stronger and continues longer than the flood; the freshets often run out below when the flood stream is running at the surface.

Lintin to Boca Tigris.—The channel westward of Lintin is reported to be so much changed since the survey was made that detailed directions can not be given, and a pilot should be employed.

When working up weigh instantly the stream slackens sufficiently to make any progress, in whatever part of the channel anchored.

Caution.—The depths in the channel westward of Lintin bar and in other parts of the entrance to the Canton river are reported to have changed considerably since the date of the survey. Extreme caution is therefore necessary.

Lankit island, 332° 19 miles from Lintin peak, forms two hills sloping westward; at its western end there is a well of fresh water near a small temple close to some trees; this part of the island is covered with earthen vessels containing human bones. A spit or flat with 2 fathoms over it extends southeastward 2½ miles from the island.

Anchorage.—To proceed to Lankit road, when about 4 miles from the island keep the highest peak of Tai kok tau just open of the outermost of the rocks projecting from the western end of Lankit 324°, which leads in about 15 feet least water to nearly abreast the western end of the island, where there are about 6 fathoms, and a vessel can moor.

Tides.—It is high water, full and change, at Lankit, at 11h. 20m.; springs rise 6½ feet, neaps 5½ feet.

Sam pan chau, or Boat islet, north-northeastward 1½ miles from Lankit, resembles a boat bottom up, and is the best guide for crossing Lankit flat. An extensive rocky bank, partly above water, projects northwestward from it and joins the shoal extending from Tai kok tau.

Canton river (Chu kiang).—The entrance of the Canton river (Chu kiang), between the islands of Chuen pi and Tai kok tau, or perhaps more strictly between Anung hoi and Tai kok tau, is divided by the Wantong islands into the two channels, Boca Tigris and Bremer channel; Boca Tigris, the eastern, is generally used for navigation.

Navigable depths.—A draft of 17 feet 6 inches is the greatest that the pilots can take up to Canton at high-water springs, and this by Blenheim passage, as there is seldom more water on Tai shek barrier; it may be necessary to proceed at night, in consequence of the diurnal inequality of the tide.

The greatest draft at high-water neaps that can reach Canton is 15 feet 6 inches.

Second bar, or that nearest the mouth of the river, can be crossed by vessels of 23 feet draft, which can also reach Whampoa, 8 miles below Canton.

There is now a depth of 12 feet on the north side of the channel through Tai shek barrier, and of 10 feet on the south side of the channel.

The draft of vessels going up to Canton is limited, as formerly, by the natural barrier at Parker point, which has a depth of 10½ feet at low water.

The passage between Whampoa and Canton by Whampoa channel should not be attempted by vessels drawing over 11 feet.

Vessels of the undermentioned draft have sufficient water to pass Tai shek barrier and Honan spit:

In the northeast monsoon season, 14 to 15 feet on the day tide, 15 to 16 feet on the night tide.

In the southwest monsoon season, 16 to 17 feet on the day tide, and 15 to 16 feet on the night tide.

Gunboats have ascended various arms of the river several miles above Canton.

Chuen pi point, the southern extreme of Chuen pi island, is close to a small peak and 1¾ miles 23° from Sam pan chau. On the northwestern point of the island is a small watch turret with Chauen pi fort under it. Pratt rock lies midway between the two points, and nearly a ¼ mile off shore, with 6 to 9 fathoms close outside.

A small bay with a sandy beach lies on each side of Chuen pi point, and fresh water may be obtained in that on the eastern side. The anchorage is in 6 fathoms, about 600 yards southwestward of the point.

Tides.—It is high water, full and change, at Chuen pi point at 0h. 0m; springs rise 7¾ feet.

Anson bay, between Chuen pi and Anung hoi islands, is very shoal and affords only a harbor for boats in Junk creek, which runs in eastward of Anung hoi island.

Bower point is the southeastern extreme of Tai kok tau, and from it southward to Sam pan chau, the western side of the channel is bordered by a flat, over which boats only can pass to the two small islets, East and West Au chau.

Anung hoi point, the southwestern point of Anung hoi island, with Keshen point, ½ mile northwestward, and the land between, form the northeastern side of Boca Tigris. There are fortifications on this side of Anung hoi, and immediately behind them Anung hoi peak rises to the height of 1,500 feet.

Wantong islands.—North and South Wantong are two small islands lying north-northwest and south-southeast 800 yards apart, nearly in mid-channel abreast Anung hoi point, and on the western side of Boca Tigris. They are surrounded by a bank which also extends 1½ miles southeastward of the southern island, at which distance the depth is only 4 fathoms. The islands are strongly fortified.

Boca tigris, deep with uneven bottom, is much contracted in width by Chain rock, which is above water, and situated nearly a quarter of a mile east-southeastward from the eastern end of North Wantong; although the passage between it and Anung hoi point is too narrow for working a large vessel, it is practicable to back and fill through with the tidal stream. Vessels generally keep near the northeastern shore in passing, the tidal streams running strongly in eddies. If detained here by the Chinese authorities, the best position to anchor is about ¼ mile northward of North Wantong in 7 to 8 fathoms, giving a berth to Wangtong rock, which lies nearly 200 yards northward of the eastern end of the island.

Light.—A fixed red light, elevated 33 feet above high water, and visible from a distance of 10 miles, is exhibited from a red brick tower with pedestal lantern, 36 feet in height, erected on Chain rock, Boca Tigris.

Bremer channel, westward of the Wantong islands, has a depth of 10 to about 4½ fathoms.

Duff rock, a pinnacle with only 18 feet over it, and 7 to 9 fathoms around, lies nearly 1 mile 330° from the eastern end of North Wantong. Sam pan chau well open eastward of the eastern end of North Wantong leads eastward of the rock.

Tiger island (Tai fu), the northern end of which is a remarkable mass of rounded granite with precipitous sides, is about 400 feet high and its summit appears cleft. Tigers Claw, the southeastern extreme of Tiger island, lies 320° 1¾ miles from the eastern end of North Wantong. A shoal extends nearly ⅓ of a mile southeastward of the Claw.

Above Tiger island the river banks become more clearly defined and assume the character of alluvial flats for many miles.

Bate rock, 400 yards northward of the northern side of Tiger island, has only 14 feet water on it; is steep-to, with 10 fathoms, mud, close eastward, and 3½ fathoms between it and the island. The eastern end of North Wantong well open of Tiger island leads northeastward of the rock.

Tauling island, 1¼ miles northeastward of Tiger island, is covered with trees. Tauling flat extends southward and westward from the southern part of the island and leaves a deep-water channel about ⅓ mile wide between it and Tiger island. Both Tauling island and flat are increasing.

Sailing vessels of large draft turning to windward from Boca Tigris should back and fill between Tiger island and Tauling flat, as the tidal streams are strong.

Calcutta shoal, situated near the center of Small bar, a 2-fathom bank of hard ground lying in mid-channel, has a depth of 10 feet over it at low-water springs. From the shoal Blake point bears 90°, distant 1,200 yards. This shoal is extending southward.

The southern peak of Tai kok tau just open eastward of Tigers Claw leads eastward of this shoal.

Parker island—Lights.—A white intermittent group light, eclipsed four times every 30 seconds, thus: Light, 16 seconds; eclipse, 2 seconds; light, 2 seconds; eclipse 2 seconds; light, 2 seconds; eclipse, 2 seconds; light, 2 seconds; eclipse, 2 seconds, is exhibited from a white mast erected on Blake point. The light is elevated 40 feet above high water and should be visible from a distance of 10 miles.

A fixed red light, elevated 40 feet above high water and visible from a distance of 7 miles, is exhibited from a white mast erected on Amherst point.

Second bar is a large collection of shoals, 3 miles in length, lying off and above Second bar creek. There are two channels over it, one on either side of the middle grounds which have varying depths of 13 to 17 feet on them and several shoal patches of 9 to 11 feet. A vessel drawing 23 feet can cross this bar, but a pilot is necessary.

Western channel is about 400 yards broad with 17 to 26 feet at low water, but two patches in it of 11 and 13 feet, respectively, lie westward of Law point. The western point of Tiger island in line with Grassy tongue, 168°, leads through in not less than 14 feet at low water. A small bank with 3 feet over it lies in the northern part of Western channel with Second bar pagoda bearing 227°, distant 1$\frac{8}{10}$ miles.

Eastern channel is taken by the pilots (1892) and considered the easier.

A rock with 7 feet water over it lies 400 yards westward of Malcolm point.

Wang lan rock, with 9 feet over it, lies 500 yards from the left bank of the river, Second bar pagoda bearing 293°; and two patches with about 11 feet over them lie within 350 yards west-southwestward of this rock.

Tai tub rock, with 12 feet over it at low water, lies 400 yards from the left bank, Second bar pagoda bearing 291°.

Tai kweichan rock, with 11 feet over it, lies 500 yards from the left bank, Second bar pagoda bearing 288°.

Sai sheklung rock is 150 feet in length, north and south, and 100 feet in width, with a least depth of 9 feet over it; it lies 300 yards from the raised bank of Pottinger island with Second bar pagoda bearing 221°. Fishing stakes are placed on and beyond this rock from November to March yearly.

Tai sheklung rock, about 150 feet in extent, with a least depth of 11 feet over it, lies 309°, distant about ½ mile from Sai sheklung, and 380 yards from the left bank.

The shoal water at the entrance to Escape creek is reported to be extending westward.

Tung kuan town, which lies about 10 miles eastward of Second bar, may be reached by 2 principal creeks, each of which has several outlets. Saw shi channel is the main entrance of the southern of the two, but it may also be gained from the southward by Chimmo creek eastward of Tauling flat, by Anung hoi creek just above the Bogue forts, and by Junk creek which falls into Anson bay above Chuen pi point. The northern channel to Tung kuan may be reached from Second bar creek, from Tseki and Escape creeks 2 to 2½ miles above Second bar, and from the junk passage northward of First bar island.

Tide scale.—On the right bank of the river in Belcher reach opposite Davis island is a beacon, surmounted by a ball, and painted black and white, showing the depth of water on Tai shek barrier and Honan spit, and 6 feet less than in Second bar Eastern channel; it also shows 2 feet more water than there is on Salt flats in Whampoa channel.

Belcher reach—Light.—A fixed red light, elevated 40 feet above high water, and visible from a distance of 4 miles, is exhibited from a white mast at the Tide pole on the right bank of the river in Belcher reach.

Blenheim passage and Whampoa channel.—At 3 miles above Escape creek and 5½ miles above Second bar, the river divides into 2 main branches, Whampoa channel and Blenheim passage, which meet again at Honan point just above the city of Canton.

By the southern or Blenheim passage the distance to Honan point from the junction is 16½ miles, and by the northern or Whampoa channel 13 miles.

Canton lies on the latter below Honan point, and 8 miles below the city is Whampoa.

About Whampoa the river in some places is unnavigable, even at high water springs by vessels drawing more than 12 feet; those of heavier draft proceed to Canton by Blenheim passage.

WHAMPOA CHANNEL.

First Bar island, low and flat, lies 2 miles above Escape creek, and near the left bank of the river; westward of it are the Flat islands, 4 in number and smaller but similar, and then the larger Danes island, the western part of which is hilly ground, marking the position of Whampoa. The channels between the Flat islands and that between No. 4 Flat island and Danes island are shallow and not used by foreign vessels, the navigable passage into the northern or Whampoa channel being immediately westward of First Bar island, with 20 to 30 feet water.

First bar, nearly ½ mile above First Bar island, lies between a shoal sand bank extending northwestward of First Bar island and a shoal spit extending northeastward from the eastern or No. 1 Flat island.

Brunswick patches, with depths of 11 to 12 feet water over them, lie about ⅗ mile above the western end of First Bar island on the left bank of the river.

There are channels between the patches and southward of them, but the narrow channel northward of the patches and close along the left bank is generally used. North shore pagoda in line with the bluff point inside Louisa island, 296°, leads southward of the patches, but over 15 feet at low water on the edge of the bank off No. 1 Flat island.

Cambridge barrier.—The barrier in Cambridge reach extends from the western extreme of No. 3 Flat island 17° across the river. There are 2 passages through the barrier, the southern for steamers, the northern for junks, each having a red spar carrying a red light at night on the northern side and a black spar carrying a green light at night on the southern side. The south channel through the barrier has now a width of 440 feet, with a least depth of 16 feet at low water. The north side of the channel is marked by a pile beacon showing by night a red light, and on the south side by a pile beacon showing a green light.

A telegraph cable crosses the river from about midway between Watson and Louisa islands to a little eastward of Bamboo town. Its direction is marked by 2 pole beacons on each bank. Those nearest the river have boards with the words, " Telegraph cable " on them.

Whampoa.—Above Brunswick patches, Cambridge reach, which leads to Whampoa, is clear with about 22 feet least water, excepting a shelf that extends northward from the Flat islands with only 18 feet on its edge in mid-channel and the barrier above mentioned. Above Cambridge reach, and on the northern side of Danes island, is the Chinese town Chang chau, known to foreigners as Bamboo town. Farther on lies the Chinese Government naval establishment, with docks and workshops. Fronting these is English reach, and above it running southwestward American reach. Opposite is Sulphur point (reported extending southeastward), formed by the confluence of Elliot passage, of which American reach is a part, and Junk creek. Sanchau town extends from Sulphur point along the left bank of American reach.

The custom-house, Whampoa, is in Lat. 23° 05′ 14″ N., Long. 113° 26′ 06″ E.

The anchorage is in English and American reaches, in 5 to 8 fathoms, soft mud; it is safe, with a moderate tidal stream; there is not, however, room for 2 large ships to moor abreast.

Whampoa anchorage is included between a line drawn from the northwestern point of No. 3 Flat island to a mound on the eastern end of Louisa island, for the eastern or lower limit; and a line drawn from Gully point to a creek on the northern side of American reach, and from Sulphur point 67° to the northern bank of the main river for the western or upper limit.

Tides.—At Whampoa the tides are affected by diurnal inequality; the following table gives the average time and rise at high water, full and change, for each month.

Month.	Time of H. W., F. and C.				Average rise spring tides.	
	Day (p m.).		Night (a. m.).		Day.	Night.
	Hrs.	*min.*	*Hrs.*	*min.*	*Feet.*	*Feet.*
January	2	30	1	10	6½	8½
February	2	20	1	40	6½	8¼
March	2	20	2	0	7	8
April	2	0	2	10	7¾	8
May	1	30	1	20	9	8
June	1	10	1	20	9¼	8
July	1	0	1	30	9	7
August	1	0	2	20	9	7¼
September	1	20	2	10	8½	7½
October	1	20	1	50	8	8
November	1	40	1	30	8	8½
December	2	0	1	20	7	9

There is a tide gauge at Whampoa custom-house, showing the depth of water off Sulphur point.

Whampoa docks.—These docks belong to the Chinese Government, and are only available for their own ships.

The dimensions of the government stone dock are: Length, 500 feet; width of entrance, 85 feet; depth on sill at high water is 14 feet; and the torpedo-boat dock is 350 feet in length, 59 feet in width at entrance, with a depth of 18 feet on the sill at high water. Both these docks are in a bad condition, the larger being entirely useless at present.

There are sheers, once capable of lifting 50 tons, on the jetty, but they appear to be worn out.

The workshops on the above premises were provided with all appliances for the construction and repair of ships; and steel gunboats were built here in 1885. Their present condition is unknown.

Whampoa to Canton.—The lower part of the city of Canton is 8 miles, and the Shamien or foreign concession 10 miles, above Whampoa.

If proceeding by Junk creek and Whampoa channels, it is better to take a pilot, although the charts are a sufficient guide for vessels of light draft if it can be ascertained that no important changes have occurred in the channels.

Caution is necessary in navigating Whampoa channel, as it is foul and rocky in many places.

In 1889, a draft of 12 feet was the most that could go to Canton by these channels, which are stated to be shoaling, and probably could not now be navigated by a vessel drawing more than 10 feet.

Caution is required when passing Whampoa barrier if the tidal stream is strong, when hug the right bank at the mouth of Fiddler's reach.

To pass the Salt flats, southward of the western part of Napier island, in 11 feet, the gauge at Whampoa custom-house must show 12½ feet, and it must be within 1 hour of high water. Just above the Salt flats a reef extends nearly 200 yards into the river from the right bank; therefore, when the small Suburbs pagoda on the south-eastern or nearest angle of the city wall comes in line with Gough's hill, which is a little to the right of the tall, square, conspicuous red pagoda of 5 stories, 332°, keep in mid stream.

The rocky ground above Dutch Folly, a small island with a fort on it, abreast the center of the city is buoyed and lighted.

Rocks in Junk creek and Whampoa channel.—A pinnacle rock and another rock of small extent, each with 8 feet over it, lie about 400 yards northwestward of the northwestern end of Pedder island.

Pa chau kok rock, about 40 feet square, with a depth of 8 feet on it, lies about 150 yards from the right bank of the river with Pa chau kok (small Whampoa) pagoda bearing 242°.

A sunken rock lies in mid-channel with the eastern extreme of Symons island bearing 58°.

Hankow rock, about 140 feet east and west, with a breadth of 40 feet, has a depth of 8 feet over it, and lies about 250 yards from the right bank of the river, with Pa chau (large Whampoa) pagoda bearing 202°.

Powan rock, about 50 feet in extent, with a least depth of 5 feet over it, lies 180 yards from the left bank of the river with Whampoa pagoda bearing 146°.

A rock, about 20 feet in area, with 7 feet over it at low water, lies ¾ mile westward of Powan rock and 155 yards from the right bank, with Whampoa pagoda bearing 112°.

A conical rock with 3 feet over it at low water lies about 600 yards westward of the last-mentioned rock, and 187 yards from the right bank; and 2 rocks, with 5 and 8 feet, respectively, over them, lie nearly in mid-channel at 433 yards and 1,000 yards farther westward.

Whampoa barrier.—Whampoa old barrier is under water; a new barrier of piles, just above water, with a narrow opening for the passage of vessels, exists just westward of the old barrier.

A fixed red light is shown from a red davit on the northern side, and a fixed green light from a black davit on the southern side of the steamer passage through the barrier.

The south channel through the barrier has now a width of 400 feet with a least depth of 9 feet at low water.

The north side of the channel is marked by two pile beacons, each showing by night a red light, and on the south side by a pile beacon showing a green light.

Reef.—A reef, with 5 feet over its outer edge, and less water inshore, projects 207 yards from the eastern side of the entrance to a small creek on the right bank of the river, and about ¾ mile above the fort on the eastern end of Napier island.

Lights and beacons.—On the sunken rocks southwestward of Dutch Folly are 3 round beacons. Nos. 1 and 2, marking the northern side of the channel, are of stone, painted red, 26 feet in height from base to vane, and each is surmounted by a lantern which exhibits, at 15 feet above high water, a fixed red light, visible from a distance of 2 miles in clear weather.

No. 3, on the southern side, is of brick and stone, painted black, 22 feet in height from base to vane, and it exhibits at 10 feet above high water a fixed green light, which is visible from a distance of 1 mile.

Light buoys.—A red conical buoy carrying a red light at night marks the northern side of the channel, and a black buoy on which is a green light the southern side, just southwestward of the beacons.

Shamien rock, with 10 feet over it, lies 300 yards southwestward of the western end of the Shamien bund.

A red and black checkered conical buoy, carrying a fixed red light at night, is moored in 12 feet on the northern side of the rock. Vessels entering leave the buoy on the port hand when rounding-to to anchor in the harbor.

Fati rock, with 7 feet over it, lies about 200 yards southward of Shamien rock and is marked by a red and black checkered conical buoy, carrying a red light at night, moored on its northern side.

Shamien anchorage.—Off Shamien the river is broad, forming a commodious anchorage for steamers, the deepest water, 18 to 22 feet and good holding ground, being within 150 yards of the river wall of Shamien; sailing vessels are restricted to Whampoa anchorage.

Shamien anchorage is sometimes very crowded when steam vessels can anchor below Honan spit.

Tide gauge.—A tide gauge has been established on the river wall close to the landing steps, at about 350 yards to the eastward of Shamien church.

To find the depth on Honan spit, add 10 feet to the depth shown by the gauge.

Canton anchorage is within the following boundaries:

On the south, a line drawn east and west through the center of Macao fort.

On the west, a line drawn 246° from the five-storied pagoda across the river on both sides of Belcher island.

On the east, a line drawn 180° from Execution point to navy-yard, Honan.

Vessels entering this and Whampoa anchorages are boarded by the berthing officer, who will direct them to proper berths, and vessels must moor in accordance with the orders received from the harbor master.

Vessels with explosive goods anchor below Macao fort at Canton, or at a distance of not less than 1 mile outside the lower limit at Whampoa. Those with inflammable goods are berthed in a special anchorage, which at present is between Bird's Nest fort and Macao fort at Canton, and outside the lower limits at Whampoa. A vessel with contagious disease on board must not come nearer than the lower limits of the anchorage.

Shamien rock and Fati rock light buoys are moored on the southeastern side of the rocks.

Mooring buoys.—Two mooring buoys for the use of vessels of the United States navy have been placed at the upper end of Shamien in 19 feet of water, with the English church bearing, respectively, 76° distant 355 yards, and 64° 317 yards.

BLENHEIM PASSAGE.

The Blenheim passage to Canton must be used by vessels drawing over 11 feet water; vessels of 21 feet draft ascend to the anchorage below Hamilton creek, 3½ miles higher, and it is generally considered that vessels drawing 17½ feet can proceed to Canton, but that there will be a sufficient depth for such vessels at high water on Tai shek barrier, Parker Point bar, or Homan spit, can not be relied on.

Collinson barriers.—The iron barrier in Collinson reach extends from No. 3 Flat island at nearly ½ mile from the eastern end, southward across the river; it has 2 openings in it, the northern for steam vessels and the southern for junks.

A bridge of wooden piles extends across Collinson reach from Danes island, at 500 yards westward of Matheson point, to Eyres point. There are two openings in this bridge similar to those in the iron barrier, and carrying similar lights at night.

Lights.—An intermittent red light with groups of two short eclipses is located on the northern side of the channel at Collinson barrier.

The light is elevated 18 feet above ordinary high-water level and is visible in the reaches east and west of the barrier. It is shown from a hut 20 feet high, painted white, surmounted by a bell.

During thick or foggy weather the bell will be struck by machinery a single blow every 6 seconds.

A green light is located on the south side of the channel.

The north channel through the Iron barrier has now a width of 570 feet, with a least depth of 16 feet at low water.

The Bridge barrier has been removed and all obstructions cleared to a depth of 16 feet at low-water springs.

Sin nanzing rock, small, and with 10 feet over it at low water, lies nearly in mid-channel in Collinson reach eastward of Rippon point.

Junk rock, lying 100 yards off the right bank of the river in Kellett reach, is marked by a black conical buoy on its northwestern side, which shows a fixed green light at night.

High island, 88 feet above high water, with shoal water extending nearly ½ mile southeastward of it, lies in the middle of the river, the northern channel only being navigable. Comus rock, under water, at 60 yards from the left bank and 250 yards eastward of the northern point of High island, narrows this channel.

Light beacons.—On the northern point of High island is a white quadrangular open-work beacon, which exhibits, at 14 feet above high water, a fixed green light visible 1 mile.

A fixed red light is exhibited from a white iron davit, 16 feet high, on Comus rock.

Brown reach, above High island, has a depth of 24 to 25 feet. Above Galbraith point, on the right bank of Brown reach, the river splits round the low flat island Chang shan. Senhouse reach, the channel southward of Chang shan, is unnavigable.

Maitland passage, the northern channel, carries deep water as far as the short cut which connects it with Elliot passage; then the depth decreases to 13 feet (20 to 21 feet at high-water springs), on either side a narrow middle ground of 10 feet.

The river is broad and deep, and affords excellent anchorage from the next hilly ground on the right bank to Hamilton creek. Vessels drawing more than 17 feet 6 inches can not go above this.

Tide scale.—A spar beacon similar to the barrier beacons, and showing the depth of water on Tai shek barrier, stands on the left bank of the river, nearly opposite Hamilton creek.

Tai shek barrier is an artificial obstruction of stones and piling constructed to prevent the approach of large ships to Canton. The passage across it by the left bank of the river has a depth of a little more than 17½ feet at high water springs, but this can not be depended on.

Three spar beacons, each 46 feet high, painted red, white, and red horizontally, and surmounted by round, wooden frames, mark the northern side of the passage. The eastern and western beacons each exhibit a fixed red light visible 1 mile.

The channel through this barrier has now a width of 400 feet, with a depth at low water springs of 12 feet on its north side, gradually decreasing to 10 feet on its south side.

The north side of the channel is marked by 2 pile beacons, each showing by night a red light, and the south side by a black conical buoy showing a green light.

A tide gauge, showing the amount of water over the barrier, is attached to each of the 3 pile beacons.

Hamilton point is the western end of Haddington island and is situated about 1,400 yards northwestward of the Tai shek barrier. The depth in mid-channel off Hamilton point has decreased perhaps as much as 4 or 5 feet since the survey of 1857.

Parker Point bar is situated at the crossing from this branch of the river into that from Canton, of which Elliot passage is a continuation. It is shoal in consequence of being out of the scour of the streams of either branch. Its shoalest part, 8 feet in the fairway, is between Parker point and Tai mei. Vessels of 17½ feet draft have passed over after examining the bar and buoying the channel.

Tai mei beacon and light.—Situated on a rock off Parker point is a spar beacon, painted black, white, and red, and surmounted by a square frame. It exhibits, at 21 feet above high water, a fixed green light, visible 1 mile, and should be left on the port hand by vessels bound upriver.

Macao Fort passage is a reach of 3¼ miles, leading from Parker Point bar to Shamien. The least depth on Honan spit, in the northern part of the passage, is 7 feet at low water by the chart, but it is stated that 17 feet at high water was the least found there in 1883. Macao fort is on an islet in the reach, and Macao Fort rock lies about

200 yards northeastward of it. The rock is marked by a black conical buoy, which exhibits a fixed green light at night, moored in 10 feet at low water on its northeastern side.

Haeshin rock lies about 250 feet eastward of Macao Fort rock, and it is marked by a conical red buoy, which exhibits a fixed red light at night, moored in 10 feet at low water on its southwestern side.

Vessels pass between Macao fort and Haeshin rocks buoys.

Bird's Nest rocks, abreast Bird's Nest fort, and 130 yards from the left bank of the river, are two sunken rocks close together, and are marked by a red conical buoy, which exhibits a fixed red light at night, moored in 13 feet at low water on their southwestern sides.

The ebb stream in Macao Fort passage runs 3 to 4 knots an hour.

Elliot passage is an intermediate branch of the river leading to Whampoa from Canton and the direct continuation of Macao fort passage. It was a fine, deep-water channel, but the bed of the river has silted up for 1 mile on either side of the barrier crossing it from the western end of Bethune island, and it is uncertain what depth there is now in the barrier channel, which is close along the right bank. The eastern end of Elliot passage leads into American reach.

Directions—Hongkong to Belcher reach and to Canton by Blenheim passage.—On leaving Hongkong harbor proceed by Kap sing mun northward of the Brothers, through Urmston road, and from about ½ mile off Black point steer to pass about ½ mile westward of Ma chau. Syah islet must be shut in by Ma chau until southwest point of Nam tau bears about 100°, when it must be opened westward of Ma chau to clear Ma chau spit. When Ma chau is abeam steer about 327°, passing westward of the fishing stakes, to Chuen pi channel. The eastern end of Tiger island well eastward of Sam pan chau leads eastward of Lintin bar.

Give a sufficient berth to Pratt rock in Chuen pi channel, pass through Boca Tigris and eastward of Duff rock, then close Tiger island to avoid Tauling flat, and having passed eastward of Bate rock, steer to pass 600 yards westward of Tauling island. When the northern end of the trees on Tauling island comes in line with Saw shi hill, steer northward for the conspicuous clump of trees on the northern side of the creek beyond Blake point; pass about 400 yards westward of Blake point, and keep this distance off the left bank of the river for ¾ mile northward of the point, when increase the distance to 800 yards. When the trees on the northern bank of Second bar creek open clear of Parker island, steer toward Malcolm point, and thence follow Pottinger island bank at about 300 yards distant, avoiding the rocks and shoal patches. This leads through Eastern channel of Second bar in not less than 12 feet at low water.

When Nimrod creek opens the vessel will be close to Sai sheklung (which is marked by a row of fishing stakes extending from Pottinger island), then, giving a berth to Tai sheklung, steer across to pass 300 yards from the Tide-scale beacon on the right bank in Belcher reach.

H. B. M. S. *Plover*, drawing 13 feet, in January, 1902, passed through the western channel, with Tiger island summit bearing 165°; the least depth obtained was 16½ feet at about half tide.

Pass through the northern openings in Collinson barriers, and southeastward of Sin nanzing rock, and westward of Junk rock buoy.

Round Bremer point, then clearing Comus rock, pass close northward of High island.

Continue through Brown reach and Maitland passage, cross Tai shek barrier, which should be reached at the time of high water, close southward of the beacons; round cautiously to the southwestern part of 26th point, Barrow island, and leave Tai mei beacon to the southwestward. Then keep in about mid-channel, leave Macao fort islet to the westward and pass between Macao fort rock and Hae shin rock buoys. Again keep in mid-channel to Shamien anchorage, leaving Bird's Nest rocks buoy to the eastward. A good mark for crossing over Honan spit is one Pawn shop just open of another, bearing about 330°.

Tides.—It is high water, full and change, at Kuper island, off Canton, in March at 2h. 40m., in May and June at 1h. 40m., in September and October, 2h. 12m.; springs rise about 5½ feet, neaps 4½ feet. From April to October the day tides are about 2 feet higher than the night tides, but from November to February the day tides are the lower.

Pilots for the river can be obtained from the harbor master's office at Canton, or from the pilot service.

Canton, Chinese Sheng cheng, the "city of perfection" or Kuang chan fu (the name Canton is a corruption by the Portuguese, the earliest European visitors, of the name of the province Kuangtung, of which it is the capital), a city and seaport, stands on the left bank of the river, about 31 miles above Boca Tigris, 70 miles from Macao, and 74 miles from Hongkong. It is surrounded by a wall 5 miles in circumference, the foundation of which is of red sandstone, and the upper part brick. The wall varies from 25 to 40 feet in height and is 20 feet thick, having an esplanade on the inside, and is accessible on three sides of the city.

The city is divided into two unequal parts by a partition wall 6 to 8 feet thick, extending east and west, having four gates, and two water gates at its extremities, through which boats pass east and west into and across the new city. The northern and larger division is called the old city, the western part of which is occupied by the Tartar population; the southern division is the new city. The suburbs are to the west, the houses being built close up to the walls. The country northward and eastward of the walls is clear. There are twelve outer gates, each defended by a two-storied guardhouse which commands the wall on either side, the principal ones having an outwork in addition.

A ditch encompasses the wall and is dry round the northern sides, which are rather elevated; nearer the river the ditch and the canals within the new city and western suburb fill with the tide and empty at low water. In the northern corner of the city stands Magazine or City hill, commanding its interior and the outside surrounding hills on the north; immediately below it is a large square building of red brick called the "Five-storied Pagoda," on the northern and most elevated angle of the wall. Gough fort is outside the city on the other side of a ravine about 500 yards northeastward of this building, and there is a rather lower ridge outside the northwestern part of the wall, which it commands. The population of the city is estimated at about 1,600,000, a large part of which resides on the water, and the river is crowded with vessels and rafts of all kinds. No census has ever been taken.

Shamien, the foreign concession, is on the point above the city southward of the western suburbs and facing Macao fort passage. Its frontage is of irregular oval form, 2,850 feet in length, its extreme breadth is 950 feet, and it is separated from the mainland by a canal 100 feet wide, faced with masonry, crossed by three stone bridges, and having a stone embankment on the river side. Of the inclosed area four-fifths at the western end has been appropriated to the British Government and one-fifth at the eastern end to that of France. All the foreign consuls reside in the British concession.

Besides the consular offices and the residence of the vice-consul, there is a church, library, reading rooms, etc., and there are two cemeteries within a moderate distance of the concessions. The consul, for political reasons, resides within the city.

Supplies.—The markets of Canton are well supplied with provisions at moderate prices; beef, poultry, fish, fruit, and vegetables at all times, to which are added in winter mutton and game in plenty.

Water is bad.

Coal.—There is no regular supply of coal kept in stock.

Wharves.—The only wharves or piers are those used by the river steamers, alongside of which there is a depth of 8 feet 6 inches at low water springs.

Repairs.—Small repairs to hull and machinery can be executed, but there is no dock.

Hospital.—There is hospital accommodation at Canton for 10 or 12 seamen.

Trade.—The value of the trade at Canton in 1902 was £10,090,993. The principal articles of import are opium, cotton and woolen goods, metals, flour, nuts, kerosene oil, sugar, and matches, and of export glass bangles, matting, silk goods, tea, and tobacco.

In 1902 the port was entered by a total of 3,670 vessels of 2,156,994 tons, of which 2,041 vessels of 1,668,894 tons were British.

Of the foreign firms established at Canton 28 are British, 10 German, 7 American, 4 French, and 2 Italian.

In the year 1905 the total value of the trade of Canton amounted to about $70,000,000.

In the same year the number of vessels that entered the port was 3,723, with an aggregate tonnage of 2,786,312 tons.

The inland steam navigation trade in the same year amounted to 27,544 entries, with a total tonnage of 385,759 tons.

Communication.—Between Canton and Hongkong there is a day and night service, carried out by 11 high-class steamers.

Climate.—Usually the temperature ranges from 42° in winter to 96° in summer; the extreme range, which is rarely reached, is from 38° to 100°; the mean temperature for the year is 70°; for January, 54°; and for July, 82°. The seasons correspond with the period of the monsoons, the hot season being from May to October, and the cool season from mid-October to the end of April.

Southwesterly winds set in early in April, but are not strong until May, when rain becomes abundant, and the thermometer rises to 85° and even higher. June is dry and sultry, while in July and August frequent showers occur almost daily, and with the strong monsoon temper the extreme heat, which averages 80° to 88°. September is again sultry, but the nights begin to grow cool, and October, though warm, is usually not unpleasant.

The first steady wind of the northeast monsoon, in the early part of November, sending down the temperature to 55° brings a sensation of bitter cold to Europeans, enfeebled by the preceding heat; but the weather of the ensuing months, in which constant sunshine, a moderately cold but agreeable temperature, and clear skies prevail almost uninterruptedly, is unsurpassable. Ice sometimes forms in January, and the thermometer registered 23° in January, 1893, on the river 28 miles below the city; this is, however, the lowest known. Fogs are common in February and March.

Diseases.—Great precaution must necessarily be observed, even by long residents, to avoid exposure to the sun and chills, and this with temperance in diet, will ordinarily secure immunity from sudden disease. Fever and ague, and sunstroke, are brought on by very slight exposures, and bowel complaints are the natural consequences of imprudent indulgence in fruits, cold beverages, etc.; much attention should be paid to suitable clothing.

CANTON RIVER (CHU KIANG)—WESTERN BRANCHES.

Between Macao, Sam shui, and Canton, on the western side of the Chu kiang estuary, is a large tract of alluvial land, the delta of that river and the Si kiang; it is intersected by a network of streams and canals, which, from the elevation of the land on the Si kiang, discharge into the Chu kiang, and with the Tung kiang or East river, which drains a large central portion of Kuangtung province and flows into the Chu kiang on its eastern side, causes the great volume of water in its estuary to be so disproportionate to its size. The greater portion of the delta has been reclaimed by embankments in past times, and the process is still being continued; this is causing the formation of new sand banks.

The principal channels traversing this delta fall into Chu kiang estuary between Kum sing mun and Second bar; besides these some small upper branches about Fat shan fall into the river between Canton and the upper part of Blenheim passage. The chief of these streams, Tam chau channel, traverses the entire delta southeastward from Sam shui, at the junction of the Si kiang with Pe kiang or North river, with branches to all the principal towns and districts in the delta. In the central district or Shuntuk nearly all the channels are connected, and one, which passes southward of Tai lung (locally Shuntuk), joins them to the Si kiang, at 2 miles southward of Kum chuk. Besides these there is the narrow Nemesis channel which, entering from the Broadway 5 miles above Moto fort, runs through Liau si wan, and joins the Wang mun or first channel northward of Kum sing mun.

Wang mun, Tam chau, and Tai kok tau channels run through level land dotted with many island-like hills, and enter the western side of the estuary through extensive mud banks between Kum sing mun and Lankit. The waters are kept in their channels by artificial embankments, without which almost the whole of the rice fields would be flooded at high water. The rice lands are principally eastward of Tai lung; westward of that town the land, although having the same features (level with island-like hills), is more elevated, being above high-water level, and cultivated with mulberry plants.

The embankments are wide, but being planted with fruit trees, with here and there the houses of laborers, leave but a paved path, about 6 feet wide, for foot passengers. The rivers and numerous canals are the ordinary mode of transport, as every field is approachable by a canal. The towns are also entered by water, the channels being staked across; in some cases an entrance is left wide enough to admit a large junk, the opening being closed by rude gates, as at Tam chau; in others these barriers consist of rows of stakes, with their heads above water, closely driven across the whole breadth of the river, leaving but a narrow and circuitous channel near one bank, through which the current runs with great strength, and often the stakes are level with low water.

The general course of Tam chau channel is southeastward, as is also that of Tai kok tau channel, which falls out of Saiwan channel below Saiwan town. Saiwan channel runs more eastward; it leaves Tam chau channel northeastward of Tai lung and flows into the Chu kiang eastward of Whitcomb island. Money-penny creek leads from Tam chau channel into the Fat shan branch above Hyacinth island.

Tai lung channel, which is southward of the town of that name, runs westward from Tam chau channel, and by a winding course connects with the Si kiang through Junction channel. Wang mun receives three branches, the Nemesis from the southwestward, and Sailam and Kerr channels from the northwestward; the latter also join the Si kiang through Junction channel. Steam vessels enter the Si kiang by the Wang mun, the entrance of which is 7 feet deep, 60 yards wide from Crag island to Mud island, and difficult. The swashway extends to 1½ miles from Ki au island. Besides these main channels there are smaller channels at various angles to them, forming connections at different points of their course. The principal of these have been explored and in all of them the depth is over 6 feet at low water springs.

The water in these channels is affected by the annual rise and fall of the Si kiang, and also by the daily rise and fall of tide.

The channels are suitable for steam vessels of light draft and about 150 feet in length, and for flats in tow of about 170 feet in length.

Kum chuk to Canton.—The route via Kum chuk, Luk lao, and Brick kiln creeks, Chunchune channel and creek, and Hamilton creek, into Blenheim passage is navigable for vessels up to 170 feet in length, with about 26 feet beam, and a draft of 4 feet. This is the shortest route available throughout the year, and it is much used by small trading craft.

The current usually runs in the same direction in these channels, but occasionally in winter when the Si kiang is low, the current may run in the opposite direction; this is caused by a high flood tide at springs.

The sounding pole is always most necessary, but especially when hugging a bank in order to escape the full strength of the adverse current. The helmsman should be a picked man.

Junk Fleet entrance has about 15 feet in it; the mud banks on both sides are steep-to.

Wang mun entrance—Lights.—An intermittent white light, showing groups of 4 eclipses every 30 seconds, thus: Light, 16 seconds; eclipse, 2 seconds; light, 2 seconds; eclipse, 2 seconds; light, 2 seconds; eclipse, 2 seconds; light 2 seconds; eclipse, 2 seconds, is exhibited from a mast surmounting a white wooden hut on a black iron pile structure, erected on the western edge of the Swashway bank at the entrance to Wang mun, which is the channel next south of Tam chau channel and leads to Kerr and Sailam channels. The light is elevated 40 feet above high water, and visible from a distance of 10 miles.

A fixed white light, visible from a distance of 1 mile, is exhibited from a pole, surmounted by a black ball, erected on the southern edge of the bank on the northern side of Wang mun entrance, abreast Cone island.

Tam chau channel is the largest stream in the delta and it discharges into the estuary about midway bewteen Lankit and Kum sing mun. The rocky hummock, 60 feet high, opposite Saiwan, is an excellent guide into it from the Saiwan channel, the second turning to the southward being taken, the first turning being McCleverty channel, which is very narrow in some parts, but a good passage for small steam vessels.

Bullock point, at the junction of Tam chau and Tai lung channels, has a spit extending southeastward 600 yards from it. There is a rock in the fairway at Essex point.

Tam chau channel to Blenheim passage.—A small creek, narrow, and apparenly always full of small craft, leads from Tam chau channel and Brick kiln creek into Chunchune channel. Its dangers are, first, a sharp turn; secondly, about 400 yards within this turn a stone barrier, just awash at low water and covered about 6 inches at high water, which runs out from the northern bank to mid-stream; and thirdly, a rock, 1 foot dry at low water, lying close to the northern bank near the eastern end of this creek. The current runs eastward in the creek. There is some difficulty in rounding the stone barrier, as a bend in the creek allows very little room. Signboards to go slow are placed at each entrance.

Chunchune channel and creek and Hamilton creek lead from Tam chau channel to Blenheim passage and are navigable, but there are some sharp turns in the short channel connecting Tam chau and Chunchune channels.

Chunchune channel is comparatively broad, and its current runs southward. Having entered this channel from the creek just described, keep in mid-channel until abreast of a small tree on the western bank (a light is fixed on this tree at night), then close the eastern bank until it begins to curve to the eastward at the mouth of a creek, when cross to the western bank and keep close to it until about a quarter of a mile below the pagoda which marks Chunchune creek entrance. The large mud bank on the eastern side of the channel is then passed; this bank extends four-fifths across the channel, at low water it is practically awash, and there is never more than 2 feet over it. A sounding pole should be kept going in this creek.

Chunchune creek is narrow and winding; there is a least depth of 5 to 6 feet in its fairway at low water. It runs through flat, cultivated country and its banks are very low. The entrance from Chunchune channel is marked by a pagoda on the edge of the southeastern bank. A rock, drying 1 foot at low water and covering 2 feet at high water, lies at the entrance and close to the southeastern bank. This creek always has a large amount of traffic on its waters; the engines should be stopped when passing these craft.

Abreast the first village on the eastern bank is a mud bank, and here the opposite bank must be closed as near as possible; a curve in the creek makes this difficult. The mud bank ends before reaching the jetty marked on the chart, when a mid-stream course is again taken. From abreast the jetty to some stone steps the eastern bank is protected by buttresses about 100 yards apart, which are covered from 6 to 18 inches and project 10 feet. The next dangers are 2 rocks marked by small posts on the bank; both are close to the eastern bank, one on each side of a sharp turn in the creek, where another creek branches off to the eastward; these rocks are said to have 3 feet water over them, and they are easily avoided by hugging the western bank while making the turn around the point opposite the rocks. At about 400 yards past this turn, and just before reaching a village on the western bank, there are 2 rocks exactly abreast of each other and close off opposite banks; they are marked by a small post on the southeastern bank. These rocks have 2 feet water over them at high water and are awash at low water; a careful mid-stream course clears them.

Three small creeks, fairly close together, open into Chunchune creek at about ½ mile past the last turn, and a rock, covered 6 inches at high and dry 1 foot at low water, is close to the southeastern bank and exactly opposite the middle of the 3 creeks. Near the mouth of this creek and on the northwestern bank a stone barrier projects 12 feet, and 30 yards or more beyond the barrier is a rock close to the same bank, which is awash at low water and covered 18 inches at high water. Farther eastward is a rock close to the southeastern bank, covered 6 inches at high water and 1 foot dry at low water; it is marked by 3 small rocky hillocks in line; these hillocks decrease in size as they approach the channel, the farthest inland being about 50 feet high, the middle one 20 feet, and that nearest the bank 7 feet.

Hamilton creek.—There are no dangers in this creek, except 2 rows of fishing stakes, which present no difficulties. This creek leads into Blenheim passage, with Tai shek barrier close to the northwestward.

Fulo kong is the principal channel through which Chinese launches towing large flats proceed when the water does not admit of Chunchune creek being used.

The chief difficulty in the Fulo kong is at its lower or southern mouth, where a sand bank in the middle of the river makes a sharp turn necessary, as well as limiting the water to 4 feet in winter at low tide, although at high water springs 9 feet could be obtained.

Hill passage, which runs northward and southward westward of Bolton and Wardroper islands, is navigated by steam vessels drawing 9½ feet.

The land has been much reclaimed. A spit stretches southeastward off Forbes point.

Saiwan channel.—A barrier consisting of stones and stakes extends nearly across this channel at 3½ miles westward of Forbes point; the passage through it is about 70 feet wide and lies close along its northern shore; care is required in passing through, as the streams are strong with swirls. This channel is easily navigated for 10 miles, until nearing Saiwan town, which may be known by its pagodas, where the stream divides into two channels round Saiwan bank, a large middle ground of hard sand and rock, with a rock awash on its eastern extremity, which is in mid-stream. To clear it, keep the southern shore of the river aboard when approaching Saiwan from the eastward, and haul close round the first point westward of Tai kok tau channel.

Steam vessels from Canton to the Si kiang use this channel and creeks, Tai kok tau channel, Yung ki junction, Yellow reach, and Junction channel.

Tai lung channel runs westward from Bullock point and is broad for 3 miles, but Tai lung rocks bar the river at the western point of Brine island, which is flat. A passage having 6 to 8 feet at low water runs close to the bank northward of these rocks, which have about 4 feet on them, and lie abreast the entrance of a small creek, with numerous trees growing on its bank, the only ones in sight for some distance. This passage, which is about 50 yards wide, is used by small steam vessels drawing as much as 9½ feet.

Between these rocks and Brine island is a 12-foot passage, very narrow and difficult, and made more so by the chow-chow water. There is deeper water in the narrow channel southward of Brine island, but the island must be kept aboard to avoid Tonze rock, off the spur of Singletree hill, on the southern shore, and another on the same shore abreast the entrance of a cutting through the island. In this cutting are 3 to 4 fathoms, but it is very narrow at its northern end, where Woodcock rock (dry at low water) lies nearly in mid-channel. Pass westward of this rock.

About 2 miles above Tai lung rocks, on passing the mouth of the large Shuntuk branch, keep over to the northern shore to avoid Clown rock, on which there is only 3 feet at low water, lying rather southward of mid-channel; they are connected with the southern shore about 600 yards above the point. Southward of the mouth of the Shuntuk branch is the large town Yung ki, which is a port of call for passengers, and in front of it, on the bank, is a small fort. One mile up the latter branch, on the eastern bank, near a small fort, is a landing place, from which a road, 6 feet wide, paved with flagstones, leads to the walled town Tai lung or Shuntuk. The inhabitants of this town and district have always been ill disposed to foreigners.

At 3 miles westward of Yung ki the river trends southward for 1¾ miles, the channel being very narrow; it then, turning eastward suddenly, emerges into Yellow reach, which is broad and the connecting link of 5 channels.

Shuntuk branch presents no great difficulty until near its junction with Tam chau channel, where in March there is a depth of 2 feet. In summer, or with a 10-foot rise, this would be a good channel. There appears to be no advantage in using it.

Kerr channel flows southeastward from the northern end of Yellow reach, leading directly to the sea by Wang mun. About 3 miles below Yellow reach, and 1¼ miles below the entrance of Yung ki junction, the channel splits round a low island, 800 yards northward of which, and stretching halfway across the river from the eastern bank, is Hand rock with only 5 feet water over it. After passing this steer for the northern point of the island and pass close westward of it, to clear Mohr rock, which has only 4 feet water over it, and lies 200 yards westward of the point, and close to the western bank. At 4½ miles farther southeastward is the entrance of Wan tung junction with Tam chau channel. This junction, which is clear and has not less than 7 feet water, runs up toward a range 370 feet high, under which stands Whampoa town. Yung ki junction has only 6 feet at 2 places, but saves a distance of 3½ miles in proceeding southeastward; near Tam chau channel it divides into 2 streams, the northern of which must be taken.

Sailam channel flows from the southern end of Yellow reach directly into Wang mun by a course 19 miles in length, which is similar to that of Kerr channel. It has 2 bars of 6 feet at 1 mile and 4 miles, respectively, from Yellow reach, and which are above and below Sailam town, northward of which this channel passes.

Sailam channel is now used by steamers bound from Hongkong to Samshui; it is shorter, deeper, and safer than Kerr channel.

Junction channel joins all these passages with the Si kiang. It is the northern of two, divided by a flat island; the southern, Junction bend, is longer and has less water.

Proceeding westward by this channel, as soon as the western end of Junction bend opens, hug the northern bank to avoid the shoal water extending across the mouth of Junction bend, hauling over to the southern shore in time to clear Forester rock, which is a pinnacle stated to have 6 feet of water over it and 11 feet around, situated about one-third the width of the river from the northern bank. There are strong eddies in the vicinity.

The best guide for its position is the commencement of some rocky hills which abut on the north bank of the river, and abreast which it lies.

Opposite the lime-burning village Mahning, under the western part of these hills, is a low island with long spits from either end and a rock on its northern side. The channel lies northward of it close to Mahning village, which is a port of call for passengers, and continues close along the northern bank for a mile, thence it keeps in mid-channel for about 2½ miles to Fist cliffs, which mark the entrance to Junction channel from the Si kiang. Mahning bar lies about 1½ miles westward of Mahning village; it has a depth of about 7 feet at low water over it, and the river is said to be shoal right across.

Lung kong creek runs southward from Junction bend to the Si kiang and appears to have a least depth of 3 feet at low river.

Kum chuk creek joins the Si kiang from within Fa chiau island with Shuntuk branch; there are a few sharp turns in it, but its chief difficulty is in the ridge of rocks which lie across its mouth at Kum chuk, leaving a channel only about 225 feet in width. It is estimated that the rate of the stream at the rapids within the southern entrance reaches 12 knots at times. During the summer steamers can not steam up the rapids, but come from Canton via Mahning. No attempt should be made to steam up the rapids until after half flood.

At the mouth of this creek are rapids formed by the rush of water from the Si kiang down the creek which has a big depression at its mouth. There are 3 rocks in the rapid at its head, 1 close to the northwestern bank and the others to the southeastern. The rate of the current at the mouth of the creek in summer, when the river is high, is about 10 knots, and to stem it a speed of at least 13 knots is necessary, and this is only a bare sufficiency, owing to the rise in the water at the head of the rapid up which the vessel has to be forced. The rapid is short, and dangerous only at the rocks at its head. The course to be steered is very clearly indicated by the line of tumbled waters, caused by the water from each side of the opening meeting and continuing together downstream; this line should be followed whether going up or down the rapid, and it is practically in mid-stream. The entrance is very narrow. In winter when the Si kiang is very low, the rapid may occasionally turn in the opposite direction. This, however, seldom occurs.

Kum chuk creek from the rapid to Luk lao creek presents no serious difficulty. A mid-stream course is safe. Close the northwestern bank when going against the stream, using the sounding pole.

Luk lao creek.—The entrance to this creek from Kum chuk creek is scarcely noticeable until nearly abreast of it. There is a small joss house with a few small trees on the eastern side of the entrance. The creek is very narrow, varying from 70 yards to 40 yards, and there are 4 very sharp turns in it. The current runs northward, with a rate in summer of at least 4 knots, and in winter of 2 to 3 knots. Going with the current in summer is trying, as besides the narrowness and turns of the channel, there are numerous rafts, junks, launches towing passenger junks, and small craft. All turns should be taken at as slow a speed as possible. Large signboards ordering slow speed have been placed at the entrance of this creek by the imperial Chinese customs.

On entering the creek from Brick kiln creek the entrance is unnoticeable, and is only indicated by a small joss house and tree on its western bank. Going southward against the current is easy, but slow speed round the turns is necessary.

Brick kiln creek, leading from the Shuntak branch at 1½ miles northwestward of the northern end of Kum chuk creek to the Tam chau channel at about 2 miles westward of Essex point, is a fine broad stream carrying 11 feet of water throughout.

Brick kiln creek presents no difficulties, being broad with only 3 dangers. First, a rock off Wang li marked by a buoy which is left to the southward; secondly, a bank off the northern bank as shown on the chart; thirdly, a row of fishing stakes (also marked on the chart), which is left to the southward. The current flows eastward. Keep a mid-stream course, but in steaming against the stream hug the northern bank, passing to mid-stream at the shoal, and, having passed the buoy at Wang li, cross to and keep the southern bank, returning to mid-stream when nearing the village and trees near the entrance of Luk lao creek.

Fat shan branch, with Moneypenny creek, Tam chau channel, and Sainam reach, is the direct channel between Canton and Samshui, and is said to be unnavigable by vessels drawing more than 4 feet. About 2 miles below or eastward of Samshui, on this branch, stands the flourishing commercial town Sainam (Hsinam).

In Fatshan branch the best water is reported to be southward of Hyacinth island, but there is a rock in the fairway there.

Moneypenny creek makes some fairly sharp turns, but has a depth of not less than 10 feet throughout.

Tam chau channel, just above the junction with Moneypenny creek, has a depth of 5 to 6 feet; above this there is better water until near the junction with Fat shan branch, where a bar crosses the channel with a depth of only 18 inches of water on it.

Sainam reach has varying depths, the least being 18 inches, and the worst place being just below Samshui where a flat extends right across.

The rise and fall of the tide here appears to be 5 feet approximately.

In summer these channels can be used without difficulty, but not too late in the year, when any case of grounding would entail the chance of remaining throughout the winter.

Pilots.—Chinese pilots can generally be obtained, but very few of them know all the creeks in the delta.

West river (Si kiang).—The West river (Si kiang), also called the Blue river, is 500 miles in length from its source to the mouth of the Broadway, its principal entrance, between Wung kum island and Ross island. At Samshui, 75 miles from the sea, where its course turns from eastward to southward, it receives the waters of the Pe kiang (North river), which rises in the northern part of Kuangtung province. From North river, and from West river below Samshui, are several branches and channels (just described) communicating with the Canton river (Chu kiang).

At the towns and villages on the river the British and Mexican dollar are current.

Si kiang entrance.—San chau, on the western side of the Broadway entrance, lies 285° 15½ miles from Little Ladrone island. There is a group of islets within about 2 miles of its southeastern side. The depths decrease gradually off San chau; there are only 15 feet at 3 miles southeastward of it, and it is reported that shoal water extends farther in this direction than is shown on the charts.

Wung kum island (Montanha), on the eastern side of the Broadway entrance, is 1,950 feet high, and Koho island lies close northeastward of it.

Water islets (Ching lung shan), 2 in number, lie close off the southern end of Wung kum; Inside islet, said to be joined to Wung kum, is 1 mile northwestward of them, and Lark bay is a bight between it and Morgan point, the western extreme of Wung kum.

The Broadway is the eastern entrance of the Si kiang (West river). It has sufficient depth to admit a vessel of 9 feet draft, the least depth found in the fairway by a vessel entering in 1897 being 11 feet, but several patches of from 2 to 12 feet lie in the entrance, and it is only used by 2 or 3 small steamers and a moderate number of trading junks in daylight.

The best time to enter the Broadway is at the first of the flood.

There are generally lines of fishing stakes with passages among them for vessels between Wung kum and Ross island, on the western side of the channel.

Tides and tidal streams.—It is high water, full and change, at the entrance of the Broadway at 11h. 0m.; springs rise 7½ feet. The neaps are very irregular, there being then only 1 tide during the 24 hours.

The direction of the flood stream outside is governed principally by the winds; with strong easterly winds it runs west-northwestward, and with southwesterly winds it runs northward. The ebb stream runs generally southwestward. Inside the river the tidal streams take the direction of the channel.

Macarira island (Toi ko ke tou), lies northward of Wung kum, Massie point, its western end, being about 354° 1¾ miles from Morgan point; Mong chau, or Ballast island, lies ¾ mile northwestward of Massie point, and there is a narrow channel between these islands and Patera island.

The old fort on Ballast island is conspicuous; it is a square, white tower, and a customs station, consisting of white buildings, on the middle hill of the island, is also noticeable.

Shoal.—A shoal with 2 feet of water on it lies with Massie point bearing 71° $1\frac{3}{10}$ miles.

Directions.—The entrance to the Broadway is well defined by the numerous islands off its mouth, and with proper pilotage is easy of access. With Inside island bearing 0° and Water islet 42° distant 1¼ miles, a 332° course leads past the rocks awash, lying between Morgan point and Massie point, in a least depth of 11 feet at low-water springs. A Chinese pilot stated that there is a deeper channel westward of the above, but that it has several obstructions in it; also that a patch of rocks is situated midway between Morgan point and Inside island.

From abreast the rocks awash steer to pass 400 yards off Ma on shan, using caution to pass the 2-foot shoal westward of Massie point, and thence steer for the western end of Mo to island.

Taipa anchorage is between the western end of Taipa island and the eastern end of Macarira island, and affords shelter, but is probably shoaling like Macao road and Broadway, and should be examined from a boat before entering in a ship. The eastern entrance to this anchorage is between Koho and Taipa or Kaikong.

Tides.—It is high water, full and change, at Taipa anchorage at 10h. 0m.; springs rise 7 feet; the tidal streams run 1½ to 2 knots an hour when not influenced by the winds. The ebb runs out of Taipa entrance, but it sets across it when outside the points.

Channel.—A vessel drawing 10 feet has passed through the channel northward of Taipa, Macarira, and Mong chau into the Broadway at high water.

Rock.—A rocky patch, about 400 feet long northeast and southwest, and 200 feet broad, with two pinnacles near its middle, on which there is a depth of 3 feet at low-water springs, lies about 100 yards southward of mid-channel between Malo chau and Macarira. A nun buoy, checkered black and red, is moored close eastward of the pinnacles. The passage northward of the buoy is the best.

Navigability.—The least depth passed over by a vessel of 9 feet draft in the fairway from the entrance of the river to Wuchau fu was 11 feet in May, 1897. Vessels to cross Second bar and the shoal water below Wuchau at all times of the year should have a draft not exceeding 5 feet and good steering qualities.

Treaty ports.—Samshui with Kongkun, Kong mun, and Wuchau fu are treaty ports, with freedom for navigation between Samshui, Wuchau fu, Hongkong, and Canton by a route from each of these latter places to be selected and notified in advance by the imperial maritime customs.

Also, Kum chuk, Shau king, and Tak hing are established as ports of call for goods and passengers, and Kau kong, Howlick, Luk pu, Yuet shing, and Luk tau for passengers only.

Do sing is a port of call for goods and passengers.

Firewood.—In the southern Chinese rivers firewood is good and cheap.

General directions.—From the Broadway the Si kiang is entered by Mo to mun, or Mo to pass, which is bounded on either side by high hills.

Steering for the western end of Mo to island, pass 400 yards westward of Sheong ma kok, then steer for Stripe cliff. A large portion of the bank in midstream northward of Mo to island has been reclaimed and is under cultivation; give the southern part of this reclaimed island a good berth, then pass westward of it, through a channel which had about 4¾ fathoms in it in 1897. Caution is necessary in this vicinity, as the bank southward of the reclaimed island is reported to be extending southward. Keep the western bank aboard to the north end of Chuk chau, where a sand bank, on which the greatest depth at low river is about 7 feet, is crossed, thence follow the eastern bank to Kep seang island, abreast which the depth is 2 fathoms.

Close westward of Mo to is the entrance of the narrow Nemesis channel leading into Wang mun.

At 11 miles above Lo chau (Creeper island), on the west bank, is a branch leading to the district town Sun wei, the position of which is marked by a conspicuous pagoda on a hill; and from the vicinity of Kep seang island the pagodas of Liau si wan eastward and the hill pagoda of Tai lung to the northward are remarkable.

From abreast Kep seang island keep in mid-channel, where the depths are 4 to 5 fathoms, to Ling tung village at the mouth of the channel leading westward to Kong mun creek.

This channel has a least depth of 2¼ fathoms off the southern part of Edgell island. Entering from the river, keep in mid-channel in 4 to 5 fathoms, until abreast a large joss house on the southern bank, then haul over to that bank to avoid a shoal spit extending from the southeastern part of Chau lin, and keep this side, passing southward of Edgell island, into the anchorage between that island and Kong mun creek. The depth decreases from 4 fathoms off the joss house to 2¼ fathoms in the narrow pass southward of Edgell island; this pass, through which the stream runs rapidly, is named Li yuk tsui. After passing Li yuk tsui, anchor in 12 feet between it and Pak shik haon, the northern entrance point to Kong mun creek.

Kong mun city has a papulation of about 100,000. The foreign settlement is on the right bank of the Si kiang at the mouth of the channel leading to the city. It consists, as yet, of three houses and numerous mat sheds standing on some filled-in ground in the mulberry fields, which extend along the river banks and a considerable distance inland. Most of the foreigners live in boats moored to the banks on the western side of the mouth of the creek. There is a British consul at Kong mun. There is no telegraph line in the district. Seventeen foreign-built steamers now regularly visit the port of Kong mun and some launches run to Macao and Hongkong; nearly all the steamers visit the port every other day. The largest and quickest of these vessels are owned by the combined companies of Messrs. Butterfield & Swire, Messrs. Jardine, Matheson & Co., and the Hongkong, Canton and Macao Steamboat Company. There are several French, Italian, and Chinese vessels.

Trade.—In 1905 the number of vessels entered was 1,285, with an aggregate tonnage of 362,925 tons. In addition, there is a large inland navigation trade by means of steam launches.

Kong mun creek being shallow, cargo is transhipped from steamers and junks into boats for conveyance to the town, which is about 2 miles up the creek. Kong mun is visited by Hongkong junks and other native craft. Timber and bamboo rafts are also found there. The chief exports are, apparently, timbers, bricks, bamboo fans, and furniture; the main import, rice. Provisions are scarce at Kong mun, and there is no meat.

The channel eastward of Chau lin is the better, with a least depth of 12 feet. It is said that there are rocks off Chau lin opposite to Bamboo island, and that the channel northward of Bamboo island is very shallow.

In the western channel a bank of sand extends nearly a mile westward of Edgell island, with depths of 2 to 4 feet on it. On each side of this shoal there is a channel close to either bank, the least water found in the southwestern channel being 9½ feet, and there is a small bank with 8 feet of water over it lying nearly midway between the northwestern part of Chau lin and the main. There is a stone pier at Chau kwan.

Sandpiper creek, the southern entrance to which is opposite the channel leading to Kong mun, runs northward and northwestward and joins the main stream a little below Plover island. The creek varies from 7 to 30 feet in depth, and there is a 6-foot bar at its northern entrance, while off Hoi chau village, and about 200 yards from each bank, is Sheung lung rock, a flat pinnacle with 3½ feet over it at low water.

Plover island, about 40 feet high, with a conspicuous house on it, is about 3 miles northward of Chau lin; pass in mid-channel eastward of the island. There is a depth of 2½ fathoms just below the island, and some rocks at Sam niong miu. About 4 miles above Plover island is Staunch island, which is small and so low that when the river is 15 feet above low river at Kum chuk it is covered; rocks extend a short distance northward and southward of it; leave this island to the eastward.

Staunch island—Light-boat.—A light-boat, showing a fixed red light, visible in clear weather from a distance of about 1 mile, has been moored immediately below this island. Just northeastward of Staunch island is the southern entrance point of the western end of Junction channel; a shoal extends about ½ mile northward of the point. About 2 miles northward of this point is Fa chiau island, with navigable channels on both sides of it. Kum chuk town lies eastward of the island and on the northern side of Kum chuk creek. Northward of Fa chiau the river bends westward, and at a distance of about 1½ miles is Tam kong chek or Opossum island, which is left to the southward.

Kum chuk and Kau kong, northward of Opossum island, ports of call, are towns important as centers of a great silk-producing district. Much cargo is now being sent to Kau kong from Hongkong.

From Opossum island there are two channels, one on either side of the 2 low, flat Ho shan islands, for a distance of about 4 miles. Two rocks, one on each bank, are reported to exist in the eastern channel at about ½ to ¾ mile southward of the northern end of the channel. In using this channel, which has been navigated by a vessel of 9 feet draft, keep midway between Ho shan island and the northern bank

In the western channel, at 1½ miles above Opossum island, is a small creek with a pagoda on its right bank and what appeared to be a fort on its left.

Off Ku lo wa, on the western bank of the river, there is a considerable ledge of rocks above water, and 2½ miles above Ku lo wa, on the same side of the river, is Sam chau town, behing a 7-storied pagoda on a low hill near it; there is also a pagoda on low land at about 1¼ miles above Ku lo wa, but on the opposite bank.

Above the 7-storied pagoda there is a channel on each side of Taiping chau. The eastern is navigable, keeping close to Taiping chau till past the low and sandy Rattler island, which at low water is nearly 2 miles in length, but only a small portion is uncovered at high river, and then edging across to the eastern bank of the river; the least depth in the fairway of this channel is 2¼ fathoms. A rock, with 2 feet over it at low river, lies 300 feet off the left bank nearly abreast the northern end of Taiping chau. The western channel is apparently unnavigable. Abreast the northern end of Taiping chau, and on the western side of the river, is a pagoda of 3 stories. From Taiping chau to Samshui junction keep in mid-channel, passing eastward of Campbell island, which is about 40 feet high, rocky, and situated 6 miles above the black pagoda. There are said to be outlying rocks off the western bank at 2 miles below Campbell island. Pak nai village is about 1 mile below Campbell island on the eastern bank, and there is a pagoda opposite it. Westward of Campbell island is a creek with a rocky patch, probably covered at high water, off its entrance. At 3 miles above Campbell island on the western bank is Cumli pagoda, which is situated in a village surrounded by trees, and not easily seen from a vessel entering till past it; at 6 miles above the island is Samshui junction, the junction of the Si kiang and Pe kiang.

Samshui reach or junction runs northeastward for 1,200 yards with a least width of 125 yards, and then, under the name of Sainam reach, extends eastward to the Fat shan branch. The least water in that part of the reach between West river and Samshui was 6 feet, in March, 1898.

Off Tweed point is a rock awash and also one just below water. Abreast the town Samshui the banks are high, but evidently covered by floods, as there is a large embankment between them and the town.

Shoal.—A sand bank lies southwestward of the entrance; it is marked by a sampan, which carries a red flag by day and a red light at night, but the sampan is withdrawn is squally weather.

Samshui is a treaty port on the Pe kiang or North river, the town being situated about ¾ mile inland. It is a place of considerable trade, but the greater part of the business is said to be carried on at Sainam, about 2 miles below Samshui on the Fat shan branch, which town, however, is not included in the treaty port. Sainam has a telegraph station; its population is 40,000 to 50,000. The actual port of Samshui is Ho hau, a miserable, straggling street extending about ⅓ mile along the river bank. For six months of the year, being outside the embankment, it is more or less flooded.

On the eastern side of Samshui junction is Kong kun, one of the ports of call, and so made because steamers are unable at all seasons to reach the anchorage off Samshui in consequence of the bar between Rattler island and the main.

Samshui anchorages leave much to be desired; that off Ho hau is obstructed in winter by shifting sand banks, so that it is closed at that season to vessels drawing over 5 feet, and that outside the bar, where steamers anchor during that period, can with difficulty accommodate more than three vessels at one time. Both are liable in summer to sudden freshets from the Pe kiang.

Beacon—Light.—A fixed red light is shown from a white beacon with white basket situated on the bank off Kong kun. It must be left on the starboard hand by vessels entering Samshui reach from West river.

Trade.—The principal articles of native produce exported by steamer through the customs are brown sugar and tea (from the Pe kiang), straw bags, paper, and rice birds. The rice birds, tasting when cooked much the same as sparrows, appear to be indigenous to the Samshui district; thousands of them are snared in nets during autumn, tinned in Sainam, and sent to Hongkong for shipment to the Straits Settlements.

In 1905 the number of vessels entered was 1,414, with an aggregate tonnage of 370,963 tons. In addition the inland navigation trade by means of steam launches amounted to 4,618 entries, with a total tonnage of 83,256 tons.

Railway.—Two passenger trains run from Canton to Samshui daily.

Rattler (Flat island) lies in the mouth of the Pe kiang, and is low, flat, and cultivated. The channel westward of the island is fairly deep on its western side, that on its northeastern side is shallow, and a bar, with depths of 4 to 6½ feet over it, extends across the channel southward of the island. The depths are subject to frequent change.

Floods may be expected once, if not twice, a year, and then only if the Pe kiang and Si kiang are in freshet at the same time. They usually occur in June and July. The highest levels above a zero of 8 feet on the bar were 26 feet in 1897, 14 feet in 1898, and 22 feet in 1899. The freshets are usually accompanied with violent squalls, and the river becomes a sea of wild, turbulent waters sweeping past like a mill race.

Directions.—Entering Samshui reach, great attention must be paid to the steering on account of the strong swirls and eddies. Keep close to the northern shore at Mandarin point, and thence in mid-channel until nearly up to Inner point; follow the southern shore to the lower end of the stone wall of Kong kun, keep mid-stream around Tweed point and along the southern coast of Rattler island till nearly up to Low point, then edge to the center of the channel, and a good line to anchor on is the tower above Sainam in line with Black rock, in about 2 fathoms. It is unadvisable to anchor southward of this line, as an extensive sand bank extends offshore, and also this part is the anchorage for the immense rafts.

Anchorage northward of the line above given is in from 10 to 12 feet; close inshore the water shoals quickly. If going to remain any time, let go a second anchor to guard against the freshets, which come down very suddenly.

It is unsafe for vessels drawing more than 6 feet to proceed beyond the line joining Fish point and the joss house near Fraser's hill during low river in the winter, as there is then only 6½ feet water on the bar, and vessels must anchor outside it.

Information can always be had from the harbor master at Samshui as to the depth on the bar, and a red flag is hoisted at the custom-house when there is less than 10 feet over it.

Vessels drawing 13 feet can reach Shamsui at high river, and from 2½ to 6 feet at low river.

When leaving and abreast of Mandarin point, the helm should be put hard a port, or the ship will be set down on Entrance point.

Numbers of native craft and immense rafts are met with between Inner and Mandarin points; as the rafts are kedged up, their progress is very slow, and impedes navigation.

NOTE.—The plan of Samshui reach is not reliable owing to the sand banks shifting, and the reach appears to be silting up in places.

The large rafts, measuring perhaps 400 feet by 150 feet, which sometimes come down the river three or four at a time, and occupy almost the entire width of the river, as well as large stacks of pine-tree branches, measuring 30 feet by 15 feet, which are floated down two abreast on boats lashed together, for burning in lime kilns and factories, are dangerous to navigation. Sometimes 20 or more of these rafts and stacks are in close proximity to one another, and several collisions occurred during the year 1900.

Trade.—The value of the imports in 1900 was $1,140,000, the principal articles being cotton goods, Indian yarn, woolen goods, metal goods, and sundries; and the value of the exports was $633,500, the principal articles being straw bags, cloth, firecrackers, paper, and tobacco.

Shipping.—The tonnage of the river steamers (not launches) in 1900 was 488,800 tons, and that of the steam launches plying on inland waters 90,900 tons. The launch traffic is very large; sometimes in summer about 30 launches pass through Samshui in a day; they are nearly all owned by Chinese.

Telegraph.—Samshui has telegraphic communication with Canton and westward to Nan ning.

Supplies.—Provisions are not plentiful, and no meat can be obtained. There is any quantity of firewood, which, cut and tied in bundles of about 12 pounds weight, costs about $10 a ton. Local coal is unsuitable for steam vessels.

The water at Samshui and above is suitable for water-tube boilers; in summer it is muddy.

Tides.—The tides at Samshui are uncertain; the greatest rise at springs does not exceed 2 feet.

In Samshui reach the stream does not turn, but slackens at times.

River level.—The difference of the water level between that in the summer of 1897 and in March, 1898, was 26 to 28 feet. The river in 1900 was remarkable for the earliness (end of July) and sustained lowness of its fall. The bar showed its maximum, 18 feet 10 inches, in July, and its minimum, 3 feet 7 inches, in December.

Pe kiang (North river), locally known as Pakkong, rises in the northeastern corner of Kuangtung province and flows southwestward for some 70 miles as far as Shao chau fu, where it turns southward and, after a course of about 130 miles through the middle of the province, passes into Sainam creek at ½ mile to 1¼ miles eastward of that creek's junction with the Si kiang. Except at certain times in the spring when a freshet forces the Pe kiang to run into the Si kiang, these two rivers never really mingle. The rises in the two rivers seldom occur simultaneously; thus in July, 1904, the Si kiang was in flood with the water gauge at Wu chau showing 51 feet, whereas the Pe kiang was only 5 feet above its winter level.

Although the Pe kiang can hardly be classed among the large rivers of China, it may claim to be considered an important waterway, having served for many centuries as part of the great trade route between Canton and the cities in the Yangtze valley. The ruins of temples, rest houses, and jetties met with all along the Pe kiang bear witness to the trade which at one time existed, but at the present day, although the junk traffic between Canton and the towns in the Pe kiang basin is still considerable, the only through trade worthy of mention is that in Kiangsi porcelain and Hunan tobacco.

The country of the Pe kiang basin northward to Tsing yuen, a distance of 43 miles from Samshui, is flat, fertile, and well populated; the conditions of trade seem to be identical with those prevailing in the Canton delta.

Beyond Tsing yuen the country is mountainous and produces little of any value, but there is excellent grazing country, especially near Shao chau fu. The river valley is sparsely populated; its trade is entirely with Canton. Piracy is now almost unknown, probably because the cargoes of the junks are not worth plundering.

The banks of the Pe kiang for some miles above Samshui continue low, the country being almost entirely devoted to the cultivation of the mulberry. The smoking brickkilns which line both banks are very noticeable; these kilns supply the cities in the delta with bricks and tiles.

Pe kiang (North river) is navigable for boats drawing 6 feet for about 80 miles in summer, but in winter even the smallest launches are unable to ascend for more than about 15 miles.

The river divides at Shao chau, the north branch leading to the Chiling pass into Hunan, and the eastern branch to the Meiling pass into Kiangsi. Goods formerly reached the Yangtze via the Siang river and Tung ting lake, or via the Kan river and Poyang lake, being carried over the passes.

April, May, and June are the only months during which a vessel drawing 2 feet 6 inches could depend on reaching Shao chau fu, but Tsing yuen could probably be reached for 6 or 7 months in each year. A heavy rainfall raises the river level 12 to 18 inches in 24 hours.

H. B. M. S. *Robin*, drawing 2 feet 6 inches, ascended the river to Shao chau fu, a distance of 170 miles from Samshui, in June, 1901.

Mong si hap gorge, 25 miles above Pak kong kiau, is about 4 miles long and from 50 to 100 yards broad; it is the largest gorge of the river. At its northern end is a bad sunken rock, which is left to the westward. From this to Ying te, a distance of 6 miles, the navigation is very intricate between numerous sand banks.

At Ta shih leng, 3 miles below Ying te, there are extensive limestone quarries, and a large trade is done with Macao.

Ying te is a town of some 3,000 inhabitants; it has telegraphic communication.

Bamboo river flows from the westward into the Pe kiang at about 6 miles from its mouth. This river is but little known. It rises in the northeastern corner of Kuangsi, and is a principal tributary of the Pe kiang. It is said to be navigable for light-draft steamers for some distance up, but there is a shifting sand bar at its mouth. Luxuriant bamboo groves line its banks for upward of 100 miles. The large market town of Shek kou, at the entrance of the bamboo country, is the chief center of trade in the district, and here great rafts are put together, which, dropping down to Fat shan and Canton through the narrow creeks in the delta, form a serious impediment to steam navigation in those waters. The towns of the delta derive their supplies of bamboo from this river.

Lu pu (Lu pao) is a busy town on the left bank of the Pe kiang at 15 miles above Samshui, and it is the seat of a big li-kin station.

Launches run daily almost throughout the year between Canton and Lu pu via Fat shan and Sainam.

Shih kio (Shek kok), 16 miles above Lu pu, is a large town on the left bank of the Pe kiang. It has four pawn shops and considerable shipping. There is a well-preserved pagoda on the opposite bank. The surrounding country is low, and a fine embankment stretches for over 1½ miles below the town.

Tsing yuen is a well-built, prosperous-looking town, extending 1¼ miles along the right bank of the river at about 11 miles above Shih kio. Its water front is filled with shipping and an unusually gaudy display of "flower boats." Its population is estimated at 3,000. The celebrated Tsing yuen tea is grown on the hills northward of the town; pan (or brown) sugar is the other chief product of the district. The chief industries are the manufacture of flour and of peanut oil. There are extensive fish ponds in the suburbs.

American Baptist and Roman Catholic missionaries have their headquarters in the town.

The hills in the vicinity of Tsing yuen are still fairly rich in timber, and tigers are said to be plentiful on their jungle-covered slopes. Here the plain abruptly ends, and the river flows through a mountainous country, practically without interruption, to the borders of Hunan and Kiangsi.

Launches run daily between Canton and Tsing yuen for about seven months in the year.

Between Tsing yuen and Ying te, which is the next town of any importance on the river, the scenery is of the most beautiful description. The country here begins to be very hilly and is well wooded. The river banks are covered with bamboo groves, the wood from which is cut annually and rafted down to Canton.

Fei loi tze gorge (in Cantonese Fi loy tze) is about 9 miles above Tsing yuen, and here the river narrows down and flows through a curved pass between hills rising abruptly some 500 feet from the water. At the entrance to the gorge, and on the right bank, is the salt station of Ta miao or Pai miao (Pak miu), where salt for the Lienchau district is transferred from the large Canton junks into smaller craft. The fishing village on the opposite side has an evil reputation for piracy. At about ¾ mile above Ta miao stands the famous Buddhist monastery of Fei loi tze, forming, with its halls, shrines, and kiosks, picturesquely placed in the midst of a thickly wooded ravine, a notable example of Chinese ecclesiastical architecture. There are limestone quarries on either side of the gorge, and these occur at short intervals on both banks of the river for the next 50 miles. A succession of boats deeply laden with limestone passes daily down the river to the lime kilns of the delta.

The river above the gorge, which is 3 miles long, broadens; the hills recede from the bank, becoming higher and more wooded than before.

Pak kong kiau (kou) is on the left bank of the river just above the gorge. There is a telegraph station at Kwan chin, 4 miles inland. The railway from Canton to Hankau is to meet the Pe kiang near this town.

Wong shih (Wong shek), a small market town, is on the right bank of the river, at 7½ miles above Pak kong kiau. Both banks of the river above Wong shih are lined with bamboo groves as far as Ta miu hap (Great Temple pass), where the river again winds between high hills and precipitous cliffs. Some 6 miles above this pass are the Censer gorges, and a little farther up is the entrance to Mong si hap gorge; here Lienchau river, flowing from the westward, joins the Pe kiang. At the junction is the busy shipping port of Kong ho (hau).

Lienchau river, the second principal tributary of the Pe kiang, rises in the northwestern corner of Kuangtung province and flows for some 90 miles through a mountainous country inhabited by the Miao tze aborigines, who still, to a great extent, secure in their inaccessible mountain homes, defy all efforts of the Chinese to control them. The principal towns on the river are Lienchau, a prefectural city of some 50,000 inhabitants and the center of trade in northwestern Kuangtung, situated in a fertile plain; Yungshan, a district city; Taiwan and Howkong, the latter a large li-kin station with a bridge of boats.

Roman Catholic missionaries have for some years past had stations all along the river, and recently American missionaries have established themselves at Lienchau.

Mong si hap (Blind Boy pass) is so called from the striking profile of a face, visible from certain directions, on a cliff on the right bank of the Pe kiang.

Ta shih leng (Lau ti wan) is on the right bank of the Pe kiang, at about 2¾ miles above Mong si hap; here limestone is carried down the sloping banks in wheelbarrows and discharged into junks.

Ying te (Ying tak), on the right bank, at 3½ miles farther up, is a small walled town with about 2,000 inhabitants, picturesquely situated in an amphitheater of rugged hills just above a range of limestone cliffs, which, jutting out into the river, form one of the numerous "gates" of the Pe kiang. It was formerly the seat of government for this part of the province and a noted Buddhist center. It is now a busy shipping port, the present limit of regular steam navigation on the Pe kiang. A steam launch runs every other day from Canton and Tsing yuen to Ying te from about May to September. Ying te is a much smaller town than Tsing yuen; it has some fair shops in the main street. There is a telegraph station.

The district produces rice, sugar, and bamboo, and a large amount of barley is grown on the river banks between Ying te and Shao chau fu.

Yung yuen (Copper river) joins the Pe kiang opposite Ying te; it is only navigable for small boats, which bring down charcoal.

Between Wang fu kang, which is 6 miles above Ying te, and Shao chau fu there are fourteen places where the river flows at the rate of 7 knots over beds of large stones, covered by 3 to 4 feet of water, the channel at these places being only 40 feet broad.

During the high river season, when West river is full of silt, the waters of North river are almost clear. The rise of water during the high-river season is not more than 15 feet, although a freshet may cause a rise of 20 feet for a few hours.

Piracy, especially in the vicinity of the great gorge above Tsing yuen, is very prevalent.

The minerals known to exist in the Pe kiang valley are (besides coal) iron, silver, copper, lead, gypsum, plumbago, and asbestos. Great quantities of firewood are taken down the river; it is cheap and of good quality. Game abounds in this region—tigers, leopards, deer, pheasants, hares, etc.

Current.—The current down the Pe kiang runs from 2½ to 3 miles an hour and is much accelerated by rains; it is divided by Rattler island and sets directly on to Tweed point. For the greater part of the year the current runs from the Pe kiang to the Si kiang, but during the height of the rainy season this is reversed.

Pilots for the Pe kiang can usually be obtained at Samshui, who will pilot a vessel to Shao chau, but a local pilot must be taken at Ying te, as the sands above that town constantly shift.

The Pe kiang for some miles above Ying te flows between high banks through a fertile country, sown with rice and sugar cane. Mong fu kong village is on the left bank at 6 miles above Ying te; there is said to be a small lake on the summit of a hill behind it. At 5 miles farther up on the right bank is the celebrated Kuan yin shan, a cliff of rock covered with dense foliage, rising almost vertically some 600 feet from the river. Here are the cave temples dedicated to the Goddess of Mercy; at the foot of the hill a stone stairway leads into the caverns which pierce the cliff in all directions.

Sha hau is 9 miles above Kuan yin shan; here the Canton salt junks tranship their cargoes into small flat-bottomed junks during the low-water season, and the small junks proceed past Shao chau into Hunan.

Wu shih (Wu shek) is a small town on the left bank of the river at about 10 miles above Sha hau; the country around Wu shih is sparsely populated.

Tantze ki (Cannon Ball barrier), above Wu shih, is a striking gorge, where the cliffs rise higher than at Kuan yin shan. (There is also a place named Tan tze ki at about 7 miles below Wu shih.)

Tak tu (Pak to) is a large village on the right bank at 8 miles above Wu shih. In the hills above Tak tu coal can be seen outcropping in many places; the coal is not now worked.

Lung kwei (Yü yuen) river joins the Pe kiang from the westward just above Tak tu; this river flows through a mountainous country inhabited by several large aboriginal tribes. The productions of the Lung kwei district are maize, bamboo, and charcoal.

Shao chau fu (locally called Shiu kuan), 12 miles above Tak tu, is the principal city in northern Kuangtung; it is well situated on a peninsula formed by the junction of Ching kiang with Pe kiang, it is surrounded by a crenellated wall in a good state of preservation, and contains about 80,000 inhabitants. The principal business quarter is the Cantonese suburb outside the wall facing the Pe kiang. The Yamêns are in the so-called native or "Hakka quarter," and within four minutes' walk of the West gate, off which there is anchorage. There are also a Hunanese and a Kiangsi quarter. Opposite the West gate is the suburb destroyed by the Taipings. Shao chau fu has no manufactories; it is a distributing center for the country around, and it is an important customs barrier; bridges of boats stretched across the rivers just above the junction facilitate the collection of duties. The imperial Chinese post has an office in the city, but the people prefer to use the native courier service, which is cheap and safe. There is a telegraph station.

Trade.—The principal exports are various oils, chiefly groundnut oil, coal, sugar, and cereals. A good deal of pottery, and also tea and tobacco, comes through from Nam heung. The imports are kerosene, American flour, piece goods, Bombay yarn, lamps, etc. The chief production is paper made from bamboo fiber, and coarse pottery is made in the neighborhood.

Coal, etc.—The coal fields of Hunan extend southward to Shao chau, and there are coal mines situated within 5 miles of that city up both rivers, which have been worked for some years past by native methods. The present output is inconsiderable, and the coal, which is taken from the surface, is of poor quality; it sells in Shao chau for about $6 a ton. In Kuangtung province generally supplies of coal are derived entirely from Japan. There is silver in the hills near Shao chau, but it is not worked.

Missions.—Three missionary societies are working in this part of the country—the Roman Catholics, with headquarters at Nam heung, who devote themselves chiefly to work among the country people; the Berlin mission, with stations at Nam heung, Chihsien, Yen fa, and Shao chau; and the Wesleyans, with stations at Shao chau, Locheng, Lung kwei, Mong fu kong, and Ying te.

Climate.—The climate of Shao chau is hot in summer, and, owing to the sudden changes in temperature, caused by alternating northerly and southerly winds, is unhealthy for Europeans. The winter is cold, frost and snow being of frequent occurrence.

Plague is unknown; cholera and smallpox are common.

Fauna.—The surrounding country, besides being extremely picturesque, abounds in wild animals of all kinds, among which deer, wild boar, porcupines, monkeys, leopards, and tigers may be mentioned. The last named are reported to be numerous; they frequently descend on outlying villages and carry off dogs, buffalo, and sometimes children. The Siberian wolf is also found near Shao chau fu. Snipe and partridge are fairly plentiful.

Pe kiang above Shao chau fu leads to Nam heung and the Meiling pass into Kiangsi; it is impeded by rapids and is navigable only for light-draft junks.

Ching kiang, or Clear river, which joins the Pe kiang at Shao chau fu, leads to Locheng and the Chiling pass into Hunan, and like the upper part of the Pe kiang it is impeded by rapids, and is navigable only for light draft junks.

Navigability.—Below Ying te the Pe kiang, although shallow in places, presents no exceptional difficulties; navigation is not hampered by rocks and rapids. Steam launches, not drawing over 4 feet water, and under normal conditions of the river, can reach Tsing yuen during about 7 months of the year, and Ying te during about 5 months (or from May to September).

From Ying te to Shao chau fu, the river narrows considerably and becomes extremely intricate with many shallows and rapids. There are few rocks, and these being close to the banks are not dangerous, but the ever shifting sand and gravel banks cause great difficulty. Navigation in this part of the river, even for native craft, depends entirely on the rainfall, and ordinary steam navigation is unknown. H. B. M. S. *Robin* proceeded from Samshui to Shao chau fu in July, 1904. The river was 5 feet above winter level on leaving Samshui. Considerable difficulty was experienced above Ying te, the rapids in places being very strong, reaching 7 knots. On the return on July 17 at about 4 miles below Shao chau fu the river rose 9 feet in 11 hours.

In April, 1905, H. B. M. S. *Robin* again ascended the river to Shao chau fu. The river was 8 feet above winter level on leaving

Samshui, and the current setting round Rattler island was practically a race. On reaching Wu shek the vessel was delayed 8 days owing to a fall in the river, and another 7 days at Tung kwn chau for the same reason. Shao chau fu was reached on May 15, the passage having occupied 23 days.

Inconvenience was experienced throughout the river from weeds fouling the screws and choking the condenser inlet. As sand banks shift, silt up, or disappear, and the channels alter, with every heavy flood, a pilot with local knowledge is indispensable to navigate the Pe kiang.

No rule of the road is observed on the Pe kiang and junks pass each other on either side at will; sometimes a man in the bow of a junk will indicate by waving the side he wishes you to go. The plan of whistling first and then waving to any junk that seemed to be taking an indefinite course has been successfully carried out. The stone-carrying junks are laden to the water's edge, and are almost unmanageable, generally drifting down broadside to the current.

Si kiang—Samshui to Shau king.—Above Samshui reach the river is divided by Fort island (Kwongsai), which is flat with a large white fort on it. For the northeastern channel pass the southern end of Fort island in mid-channel, then follow the eastern shore at the distance of about 200 yards. At the northern end of this channel there are two rocks off the red cliffs. Depths of 5 to 7 fathoms were found in this channel, and the pilots prefer it to the southwestern channel.

The channel southwestward of Fort island has depths of 3½ to 7 fathoms a little to the mainland side of the center of the channel.

When past Fort island keep along the northern shore of Kwang li reach till abreast Wing on village, then get into mid-channel. Round White sand point, then proceed with the north coast of Kwang li island aboard, but not very close, through Kwang li bend.

The channel southward of Kwang li island is full of shoals, and a long spit extends from each end of the island. There is a 15-foot passage through this channel.

When clear of the island and where the river is very broad abreast Tau kai town is the First bar; there is 5½ feet of water here at low river.

Four miles above Kwang li is the entrance of Great pass (Ling yang), the river flowing amongst mountain ranges, which rise to the height of 2,814 feet. This pass is 3½ miles in length, and nearly straight, and in its narrowest part from 200 to 300 yards wide; the greatest depth in the pass is 30 fathoms at its northeastern end.

Shau king, a large walled town and a military station, with an extensive suburb lying westward of it, stands on the left bank of the river, surrounded by hills and waterways, at 20 miles above Samshui junction, and 6 miles above the pass. Provisions are scarce, and no meat can be obtained. It is connected by telegraph. The population is estimated at 80.000. It exports straw mats and bags; carved steatite ware is a local industry.

The river here is 1,200 to 1,500 yards wide, with a least depth of 4½ fathoms along the left bank, but a sand bank, awash at low river, extends off the right bank.

The water is said to rise when in flood about 40 feet above winter level, and to reach the roofs of the houses on the bank, and even the town gates.

The tidal influence was felt at Shau king, there being a rise and fall of 3 feet or more in February, but the stream, though completely checked by the flood, does not turn.

Shau king to Wuchau fu.—For 22 miles above Shau king the river winds through a hilly country, opening out again near Narrow island, which appears in the center of the river covered with bamboos, but is joined by sand banks to the left bank. The sands off this island are said to have increased; it is therefore advisable to keep over near Tree head, on the right bank; the channel is difficult, with dangers on both sides. The hills, varying from 100 to 1,500 feet in height, are in general densely wooded, and many of them are highly cultivated. Occasional rugged hills of marble are seen, one of which, of most picturesque form, crops out on the left bank of the river at 30 miles above Shau king, and is called Kai kwan shek, or the Cock's comb, which it strikingly resembles. There is also a range inland 2 miles northward of Shau king, named the Seven stars, after the constellation of the Great Bear.

Luk pu, 15 miles above Shau king; Yuet shing, 11 miles farther up; and Do sing, a market town about 30 miles above Chau king, and a considerable center of traffic, exporting rice, and groundnut oil and cake, with 3,000 inhabitants, were opened to trade in 1903.

From Kai kwan shek, by an easy navigation of 16 miles, the walled city Tak hing is reached.

Tak hing is apparently a dirty town of about 6,000 inhabitants, which exports a little cheap matting; it has telegraphic communication. Provisions are scarce, and no meat can be obtained. The river here is 800 yards wide, and a bank extends off the town to about mid-channel; southward of the bank there is a depth of 5 fathoms.

The river at about 3 miles above Tak hing takes a short, sharp twist around Steep point, on the right bank, which must be closely and carefully passed to avoid Flat rocks and the chow chow water, which may turn a vessel's head against the helm. Flat rocks lie off the left bank a little above Steep point and are said to be pinnacles awash at low river. In Fa piu reach there are 2 rocks in mid-stream about 200 feet apart. At about 10 miles above Tak hing, and on the left bank of the river, a single mass of granite in the form of a thumb rises perpendicularly some 300 feet out of a range of hills 1,410 feet in height. Its local name is Kum kwo shek, but it is also called Fa piu, or the Monk's head, and it is most remarkable. After passing this, navigation becomes dangerous, as the river bed is studded with rocks.

Fa piu rocks.—A group of 3 rocks, which uncover 7 feet at low water, winter level, is situated at 80 feet from the bank immediately under Sheong ti temple.

Do sing to Wuchau—Buoyage.—From Do sing (Tuching) to Wuchau, a distance of about 27 miles, the river has been buoyed by the customs authorities. Some 15 buoys now indicate during the low-river season all the most dangerous rocks and shoals that obstruct the approach to Wuchau.

Fa piu rocks lie in mid river southwestward of the mountain of the same name, and to clear them keep the right bank aboard. At the first bend above this, Fairies bridge reef is said to extend two-thirds across the river from the point on the left bank which lies opposite Tuching village. After passing Tuching keep on the left bank to Tu lok heu, 3 miles above on the left bank, to clear Pa chŭng bank and Tu lok spit, then steer for the joss house just below Szi pi in a least depth of 1¾ fathoms, and when abreast of Chiong kong keep on the right bank until near Second bar, which cross in mid stream. The least water at lowest river over Second bar and past Janus and Webster rocks is said to be 6 feet; the channel is reported to shift.

Bullock rock is not noticeable, but Kopi joss house, which has bamboos in front of it, is a good mark for Second bar.

Fa piu, in line with the hollow between 2 hills, bearing 151°, is said to lead in the best water across Second bar and between the Kok heu banks on the left bank and Robinson, Janus, and Webster rocks on the other in 2¼ fathoms. When past a rock off the ruined obelisk on the right bank, keep toward that shore past the small walled city Fong chuen (about 28 miles above Tak hing), 2 miles above which Kai river or Ho yune, a tributary, falls into the river; at the entrance of the Kai is an earthwork.

Coal can be procured at Fong chuen, but notice must be given.

From about ½ mile above Fong chuen keep on the left bank till about 1 mile above Kai river entrance; then pass close under the bamboo plantation on the right bank to clear the Twin rocks in mid stream, which are sometimes submerged, when their positions may be marked by ripples; keep close round the point and under the High bank, and leave Watchful rock on the port hand.

The rocks between Watchful rock and Wuchau fu are usually marked by bamboo poles; they are 4 in number, and the course leads between them. No dependence can be placed in the bamboo poles marking rocks in the river being in position, as they are constantly shifted by rafts.

Wuchau fu, a treaty port and the frontier city of Kuangsi, is 75 miles above Shau king, 170 miles from the sea, and stands on the left bank of the Si kiang at its confluence with the Fu ho or Kweiling ho. Wuchau is an old city (592 A. D.), and is surrounded by a high brick wall 1½ miles in circumference, inclosing the southwestern side of a low hill. The upper part of the hill is not built on, and the lower part consists of mean filthy streets and official residences. The business quarter lies between the city wall and the left banks of the Si kiang and Kweiling. New buildings are everywhere in course of construction. The population of the city and suburbs is estimated at 50,000. It is connected with Samshui and also with some up-river towns by telegraph.

In winter the Si kiang opposite the city has a breadth of 800 to 900 yards, while in summer, when it overflows its sloping left bank (on the right bank is a range of sparsely wooded hills 400 to 500 feet high), it has a breadth of about ¾ mile.

River level.—In 1897 the lowest water was taken as a datum for the zero mark at Wuchau; since that time the river has fallen 2 feet 10 inches below the zero and risen 68 feet above it, so at the time of low river vessels drawing over 7 feet run the risk of grounding in several places in the river.

The rise of the Si kiang is irregular; in 1904 the first rise occurred about the 24th of May, and the second about the 20th of June. The water was 28 feet above Wuchau zero on the 25th of May.

On the 1st of August, 1906, the river at Wuchau was only 13 feet above zero, but by the 17th of August it had risen to 42 feet above.

The period of low river appears to last from the beginning of December to the middle of March, after which the river rises rapidly, attaining its highest level in June, and falls again gradually from the end of September. In February, 1903, the river rose 22 feet in 24 hours without warning.

Wuchau can be reached by vessels drawing 13 feet at high river, and 6 to 7 feet at low river. A gauge placed on the right bank of the river indicates the zero and the depth of water exceeding 9 feet on Second bar, below the port.

Tides and current.—Springs rise 12 to 18 inches at Wuchau. The rate of the stream during high floods in the gorges is 5 to 8 knots, with bad swirls; the average rate in winter is 1¼ knots.

Supplies.—Provisions are not plentiful, and meat is not procurable. Coal of an inferior quality can be obtained at $5 a ton.

Communication.—A daily steamship service (no departure on Saturdays) is maintained between Wuchau and Canton; there is also a regular biweekly service with Hongkong.

Steam launches ply regularly on the upper reaches of the West river as far as Long chau in the extreme west, Posé on the Yunnan frontier, and Liau chau in the north. The privilege of running to these distant places is at present reserved for vessels under the Chinese flag.

Fu ho or Kweiling ho is much smaller than the Si kiang, but it is navigable by junks as far as Kweiling, the capital of Kuangsi province, and by boats of light draft as far as the Yangtze, for the Fu ho and the Siang of Hunan province are connected by a canal northeastward of Kweiling. In June, 1903, the river was ascended by H. B. M. S. *Sandpiper* for 55 miles, when a 10-knot stream was met; 3 rapids were passed.

Wuchau to Nan ning.—For the first 15 miles the river flows between 2 ranges of hills, the bases of which sometimes reach the water's edge and sometimes recede, leaving open spaces where farmhouses or small villages stand in the midst of cultivated patches, planted for the greater part with mulberry. In a few places small clearings have been made upon the hill slopes, but the hills are usually either bare or overgrown with shrubs and small trees. Lines and clumps of splendid bamboos stand along the river banks.

A small tributary enters the river near Teng hien, which is a district city, with 10,000 to 20,000 inhabitants, 25 miles above Wuchau. It lies in a space of more open country, and has well-built houses and a set of stone steps leading down to the river. The banks of the tributary in June, 1901, were lined with immense piles of firewood.

At Yong chu tan sin, about 14 miles above Wuchau, the river runs between fine cliffs about 1,000 feet high. On the summit of those on the right bank is a five-storied pagoda, very conspicuous both up and down stream.

For 30 miles above Teng hsien the river runs along a narrow valley, the hills never rising much above 400 feet until just beyond Pak ma (Pai mao), when a very bold rocky chain bears away to the northwestward and curves around until it again touches the river at Ta huang.

Ping nan is a walled prefectured city. On market days, two or three times a week, there may be 10,000 people in the city, most of whom come in from the country around, but the actual population of the place is very much less. Hides are the chief export, whilst rice and cotton piece goods are the chief imports.

Meng kiang hiu, 36 miles above Wuchau, is a large village, and Pai mao, 12 miles farther up, is a small village in a miserable condition, which is the outlet for the cassia produced in the district. Above Pai mao the land opens out into a wide stretch of undulating country. Maize and mulberry are the principal crops. Considerable quantities of silk are produced in the neighborhood. Villages are larger and more numerous, but a good part of the land is apparently too poor to be worth cultivating.

Kau wei yau tan (Dogs' tails rapid), about 5 miles above Meng kiang hiu and abreast Huang tuo chau island, is about 1 mile long, with a current running about 8 knots and very strong swirls, the water at Wuchau being 28 feet above zero; the course through passes between rocks only a few yards apart. This rapid improves with a rise.

Ta kio miao (Great tusk) is about 1 mile below Pak ma (Pai mao). The current and eddies are very strong here at high river, but there are none with the water at 28 feet above zero at Wuchau.

Ping nan hiẹn, 66 miles above Wuchau, is a district city with 10,000 to 30,000 inhabitants. The houses are well built and nearly new, as in most cities on the Si kiang. The place has a prosperous and busy appearance, and the principal street contains many fine shops, a considerable number of which deal in foreign goods. Many junks anchor here and in the adjoining creek.

Navigation—Rapids.—From Wuchau to Ping nan the navigation of the river is extremely intricate. Most of the rocks in or near the channel are marked with cairns, some standing well out of the water, some awash, and others submerged, showing dangerous swirls and eddies. Most of the rapids give little or no trouble or cause for anxiety, with the exception of the Kau wei yau tan rapid. There is but little traffic on this section of the river compared with that below Wuchau.

Above Ping nan the river traverses a broad plain bounded on the northwestward by the range of hills above mentioned.

Ta huang, 77 miles from Wuchau, is a large commercial center and a common anchorage for junks going both up and down stream; in fact, it is the port of Hsun chau. There is a daily steam-launch service to Wuchau. The Ta huang kiang here flows into the Si kiang.

Hsun chau fu, 12 miles above Ta huang, is beautifully situated at the junction of the great Wu kiang, or Liau chau fu river, the northern branch of the Si kiang, with the Yu kiang, or south branch. It lies at the southwestern end of a range of bare hills, 2,000 feet high. Liau chau fu river appears to penetrate a gorge in the mountains, at some distance beyond which it divides into 2 branches, one going northward past Liau chau fu, the other being the Hung shui kiang, or Red Water river, which is the longer but less navigable branch. The height of water in the Yu branch depends to a great extent upon the supply from the Liau chau fu branch, as a great flood from the latter has the effect of checking the exit of water from the former.

Hsun chau fu is a prosperous city with 30,000 to 40,000 inhabitants, where many wealthy firms of merchants are established. It is a center for the timber trade and a collecting place for the silk produced in the prefecture.

Firewood, timber, and bamboos come down the Liau chau fu river in very large quantities. The timber and bamboos are made up into great rafts, which drift slowly down the stream under the guidance of a few men who live upon each raft. It would seem that large forests line the banks of the Hung shui kiang.

Liau chau fu river, the northern branch of the Si kiang, and which joins it just below Hsun chau, is said to be full of rocks and rapids, but steam launches run regularly from Wuchau to Liau chau fu.

Yu kiang (Nan ning river), between Hsun chau fu and Kwei hsien, is from 150 to 350 yards wide. The country above Hsun chau becomes much more desolate and consists of rolling downs covered with long grass and pines. The villages are few and small. Some sugar is grown and many ponies are reared.

Hills can be seen in the distance, with occasional rocky peaks rising abruptly. The principal crop is maize, which is planted even along the shelving banks of the river, but there are many places in this part of the country where the land is not cultivated at all. Villages appear at rare intervals along the banks; the principal are Pai cha hui, at 25 miles above Hsun chau, and Tong tsin yi, at 37 miles; both are small, and depend for their existence upon fishing and small markets.

About 15 miles above Hsun chau a range of hills divides the plain. In the last 10 miles before reaching Kwei hien (or 50 to 60 miles from Hsun chau) cultivation becomes more general; the principal crops are maize, indigo, sugar, and groundnuts.

Kwei hien is a district city of some 30,000 inhabitants, situated at the foot of a range of mountains, which extends northward in a great curve. It appears from the river a pretty and most prosperous little city, with some fine buildings. The city wall is in good condition. The majority of the inhabitants live outside the city, in the eastern suburb, where all business is transacted. The southern part of the city contains 1 principal street, running parallel to the south wall; the northern part consists of small cottages, surrounded by gardens and fruit trees. Two of the principal articles of trade are groundnut oil and a manure made from the refuse of the nuts after pressing.

There is a telegraph station at Kwei hien; the telegraph wire follows the left bank of the river from Wu chau. There are two schools, an upper and a lower elementary; the university has been suppressed. There is also a French mission in the city.

Silver mines exist at Sam cha san, a place about 15 miles to the northward of Kwei hien; they have not been worked for some time, but are said to be rich.

About a mile above Kwei hsien the telegraph line to Pakhoi is carried over the river on high poles.

Rapids above Ping nan—Ku yong tan, about 5 miles above Ping nan, is only ¼ mile long; the whirls and eddies in it are very strong and the current had a rate of about 9 knots when the water was 28 feet above zero at Wu chau. This rapid improves with a rise.

Tong ku tan (Brazen Drum rapid) is just below the junction of the Yu kiang or Nan ning river and Liau chau fu river; there are many rocks in it and strong whirls and eddies, but it improves with a rise.

The navigation of this rapid is said not to be so intricate as those previously mentioned, but in August, 1906, H. B. M. S. *Moorhen* found the current in it to be running about 10 knots, which was the greatest velocity experienced anywhere between Wu chau and Kwei hsien.

Just above this rapid the change in color from the dark brown water of the West river to the clear blue of the Nan ning river is very marked.

Ma pu tan, about 2¼ miles above Hsun chau, sometimes has a bad swirl in it between a point and a reef or rocks; this rapid improves with a rise of the river.

Lei kung hsu is a village 30 miles above Kwei hien.

Great rapid (Kiang kiun tan) begins at 3½ miles above Lei kung hsu, and is really a series of rapids caused by rocky barriers in the river, where it passes through a gorge. There are 3 rapids; the first straight, but with a strong current and heavy swirls; the second, the worst, has a very narrow channel, about 80 feet wide between the rocks, with a nearly 8-point turn, and the water rushing down in whirlpools with huge eddies; the third is not so bad, but the channel bends toward the right bank and passes between rocks, which makes it awkward, the current being very strong.

On the bank just above the second rapid, known as Ni pi tan (Mud Wall rapid), where the channel curls into a corner on the northern side, is a fine temple in a grove of firs, used by the pilots and junkmen to pray in for a safe crossing. Beyond the range forming the gorge is a wide, open plain, with mountains in the distance, the plain being cultivated principally with maize.

In ascending this rapid the channel for the first 2 miles is close along the left bank till abreast the upper end of Tsing chao chau island; it then turns right off the bank for 300 yards and passes between two rocks about 40 feet apart, through strong whirls and eddies, when it makes a sharp turn into the left bank, and crosses the second rapid close to it. Thence the channel runs off into midstream and crosses the third rapid on a course rather toward the right bank. This rapid improves with a rise of the river. It is known also as the Fu po ti tan.

San chau tan (San che li chang tan) (Long rapid) commences a little above Heng chau, and is 7½ miles long; the channel is close to the right bank and it is fairly easy to navigate.

Ta uang miao is about 5 miles below Yung hsun hien; there is a short rapid here with a very strong current.

Heng chau is situated picturesquely on the left bank of the river at about 20 miles above the rapid.

A few miles beyond Heng chau the river flows between two ranges of high hills covered with fine trees and with much vegetation. At the foot of the hills by the riverside and on the numerous islands are lines and clusters of beautiful bamboos.

Nan hiang hiu is a riverside village off which junks anchor. This is the terminus of the old route, partly by land and partly by water, between the West river and Pakhoi. Goods going from Nan ning to Pakhoi all pass Nan hiang hiu, which is practically the nearest point on the river to the sea, from which it is distant 85 miles.

Fei long tsuen, 12 miles above Nan hiang hiu, is a tiny village; for 10 miles above it the country on both sides of the river is hilly and densely wooded in many places, the vegetation reaching to the water. Farther up the hills gradually become lower, and in many places are terraced for cultivation, finally sinking into plains.

Yung hsun hien is 21 miles above Fei long tsuen, and here the river takes a right-angled turn and leads toward a range of high mountains consisting of two parts, one running north-northeastward and the other westward, which latter the river follows closely until the hills fall into gently sloping downs. Yung hsun hien is connected by telegraph.

Pu miao hiu village is about 30 miles from Nan ning.

Ling li hiu is 12½ miles above Yung hsun hien, and Man tau tsuen is 2 miles farther up. There are anchorages at these places, but they are the only ones for many miles on either side.

Navigability.—H. B. M. S. *Moorhen*, drawing 3 feet 1 inch water, ascended the Si kiang from Wu chau to Nan ning in June, 1904, the water being 28 feet above zero at Wu chau. There are apparently no leading marks for the channels. The most difficult parts in ascending the river were Dogs Tails rapid and Ku yong tan; the other rapids were not found to be dangerous. Owing to the river having risen 2 feet, the passage down the river was much easier than that going up.

Navigation to Nan ning was maintained from April to the beginning of December, 1905, by vessels drawing 4 feet of water, and after that until the middle of February, 1906, by a motor launch drawing

1½ feet, which but for an accident to her machinery would have continued running.

As rapid movements of the helm are necessary when navigating this river, the steering gear should be in good order in every respect.

Nan ning fu was opened as a treaty port on January 1, 1907.

The approach to this city is very pretty, the river running, with many windings, through an open plain, and the banks consisting of almost level grass land, leading to groves of splendid bamboos and to picturesque villages shaded by trees.

The first view of Nan ning shows a very large and prosperous city. It is situated on the left bank of the river, and the southern wall follows the bank closely at the eastern end, but recedes some distance from it at the western. The walled inclosure is small for a prefectural city, and the greater part of the inhabitants live in the suburbs outside. A census taken in 1900 gave the population as 170,000. Nan ning is connected by telegraph.

Trade.—The principal importance of Nan ning lies in its position as a center for the collection and distribution of goods and commerce of the 4 provinces, Yunnan, Kueichau, Kuangtung, and Kuangsi. Small quantities of tobacco and star aniseed are produced in the prefecture, but Nan ning is not a great producing center. The principal articles passing through Nan ning are opium, white sugar, aniseed, artemisia, paper, ox hides, horns and bones, cotton yarn, and kerosene.

Navigability.—The Si kiang, with the Yu kiang, is navigated by large cargo boats, drawing 2 to 4 feet up to Nan ning, and by smaller boats to Pose, an important district town, approximately in Lat. 24° N., Long. 106° E.; the Tso branch, which joins the Yu at about 12 miles westward of Nan ning, is navigable by boats to Long chau.

Steamer navigation presents few difficulties for vessels of light draft as far as Hsun chau fu at the junction of the two branches of the Si kiang, the Wu kiang or Liau chau fu river, being the northern branch, and the Yu kiang or Nan ning river, the southern. Steamers drawing 2½ feet can proceed above Hsun chau fu, the principal difficulty being the Great rapid; this, however, is constantly taken by heavily laden cargo boats.

There is no doubt that navigation above Wuchau is dangerous, and is only possible with a thorough knowledge of the river.

H. B. M. S. *Sandpiper*, drawing 2 feet 8 inches, ascended the river to Nan ning in June, 1901, leaving Wuchau with 30 feet on the water gage. Difficulty was experienced in crossing the Great rapid, not so much in the want of a sufficiently deep channel as in making the sharp turns among the rocks. Above the rapid the river was not found difficult.

Pilots.—The pilotage charge is $250 and a present (or kum sha) of $50 to take a vessel drawing 3 feet 1 inch from Wu chau to Nan ning and back, but only $70 should the vessel be unable to proceed above Kwei hien.

Above Nan ning.—It is reported that there are no serious difficulties or rapids at high water in the rivers above Nan ning; both Pose and Long chau are now regularly visited by steam launches.

The French gunboat *Vigilante* reached Long chau in the summer of 1905.

From Wuchau to Ta huang the river is full of rocks, but there are good channels and no bad rapids. At Hsun chau there are many banks of sand and stones, and a current running 8 knots has been experienced here in May, the rate below this being about 4 knots.

Thence the channel continues good to Kwei hien, which can be reached by launches drawing 5 feet at all times of the year, and at present this is the limit of their navigation. From Kwei hien to Nan ning there are many difficult places, the worst being the Great rapid, and the river is tortuous at 50 miles, and also at 10 miles below Nan ning. Junks have to lighten to 2½ feet at low river. There is a great difference in the navigability of the river at low or at high river.

The Great rapid is believed to form an effective bar to anything like regular communication with Nan ning. At no time during 1900 could this rapid have been crossed by the *Sandpiper*.

At a first glance the river above Wuchau appears almost deserted; the banks are high, and the junks deeply laden, and the river is so wide that it is quite possible from one side to overlook boats being tracked up river on the opposite side. The shipping consists almost entirely of large junks making journeys to Hsun chau, Kwei hien, and Nan ning. These craft are of a practically uniform type, well and strongly built, 75 feet long, 15 feet beam, and draw 5 to 6 feet of water. The rudder is 15 to 20 feet long, and the junks are also steered from the bows by means of a large oar, unusual steering power being necessary. The carrying capacity is 40 to 47 tons. On the up-river journey they are hauled by trackers, and sail when the wind is favorable; on the downward journey sweeps are sometimes worked. The average rate of traveling up stream is 20 miles a day; it sometimes reaches 30 miles; the rate downstream is of course much faster.

Passenger steam launches run on the river regularly all the year, except in winter, as far up as Kwei hien.

The rivers running into the Si kiang from the northward, as the Ho yune, Fu ho, etc., have clear water and are navigable for 30 or 40 miles in summer; those running in from the southward are all muddy.

Pilots.—Pilots are necessary; those employed by the *Sandpiper* were very good, their knowledge of the river was excellent, and the information they gave as to the positions of rocks, the depth over them, etc., was correct. Pilots can be obtained through the British consul at Wuchau, or Messrs. Jardine, Matheson & Co., Wuchau.

Coal can be sent up the river by junk.

People.—The people were found by the *Sandpiper* to be quiet and friendly.

Above Nan ning there is one rapid at the junction of the Si kiang or Yu kiang and the Tso or Long chau river. With a low river navigation above Nan ning is said to be impracticable, but with a high river the difficulties mostly disappear. Probably a steamer could get to Pose during 4 months of the year; it would be doubtful for 4, and impossible for the remaining 4.

Distances.—The distances above Wuchau are approximately—Teng hien, 25 miles; Meng kiang hiu, 36 miles; Pai mao, 48 miles; Ping nan hien, 66 miles; Ta huang, 77 miles; Hsun chau fu, 89 miles; Kwei hien, 149 miles; Heng chau, 204 miles; Nan hiang hiu, 221 miles; Yung hsun hien, 242 miles; Nan ning fu, 319 miles; Tung yuen, 424 miles; Ping ma, 485 miles; Pose, 574 miles.

Communication.—The Imperial Chinese postal system extends to Pose, Nan ning, Kweiling, and Kweiyang. Letters are accepted at Wuchau post-office for Chungking and the Yangtze, via Kweiling and Kweiyang.

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